# **Dataset 1 for glass transition temperature**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Reference** | **SMP name** | **BigSMILES** | **Glass transition temperature (°C)** |
|  | **Training data** | | | |
| 1 | Castro et al. 2010[1] | tba & PEGDMA | { C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C C C O C ( = O ) C ( $ ) C $ } | 49.36 |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C C C O C ( = O ) C ( $ ) C $ } |
| { C C C C O C ( = O ) C ( $ ) C $ , C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ } |
| { C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C C C O C ( = O ) C ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ } |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C C C O C ( = O ) C ( $ ) C $ , C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ } |
| { C C C C O C ( = O ) C ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ } |
| 2 | Wang and Li 2015[2] | Styrene-based SMP | { $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 , C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $ , $ C C ( $ ) c 1 c c c c c 1 , } | 20 |
| { C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $, , $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 , $ C C ( $ ) c 1 c c c c c 1 } |
| { $ C C ( $ ) c 1 c c c c c 1 , C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $ , $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 } |
| { $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 , $ C C ( $ ) c 1 c c c c c 1 , C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $ } |
| { C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $, $ C C ( $ ) c 1 c c c c c 1 , $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 } |
| { $ C C ( $ ) c 1 c c c c c 1 , $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 , C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $ } | 20 |
| 3 | Yakacki et al. 2008[3] | MMA-co-PEGDMA | { C C ( $ ) ( C $ ) C ( = O ) O [ < ] C C O [ > ] C ( = O ) C ( C ) ( $ ) C $ , C O C ( = O ) C ( C ) ( $ ) C $ } | 76 |
| { C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O [ < ] C C O [ > ] C ( = O ) C ( C ) ( $ ) C $ } |
| 4 | Lakhera et al.2011[4] | PEGMA&DEGDMA&tba | { C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ } | 53.35 |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ } |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ } |
| { C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ } |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ } |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C O C ( = O ) C ( C ) ( $ ) C $ , C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ } |
| 5 | cui2010[5] | EG72D | { < 1 C C C C O < 2 , O = C ( > 2 ) N C 2 C C C ( C C 1 C C C ( N C ( = O ) O C C C C O > 3 ) C C 1 ) C C 2 , O = C ( > 3 ) N C 2 C C C ( C C 1 C C C ( N C ( = O ) O > 1 ) C C 1 ) C C 2 } | 71 |
| { O = C ( > 3 ) N C 2 C C C ( C C 1 C C C ( N C ( = O ) O > 1 ) C C 1 ) C C 2 , < 1 C C C C O < 2 , O = C ( > 2 ) N C 2 C C C ( C C 1 C C C ( N C ( = O ) O C C C C O > 3 ) C C 1 ) C C 2 } |
| 6 | Arrieta2013[6] | acrylate SMP | { C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C c 1 c c c c c 1 } | 60 |
| 7 | Wu et al., 2016[7] | DGEBEF/DDS  DGEBEF/DDS | { O = S ( = O ) ( c 1 c c c ( N( > ) > ) c c 1) c 2 c c c ( N ( > ) > ) c c 2 , O C ( C < ) C O C C O c 5 c c c ( C 4 ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c c c 2 c 3 c c c c c 3 4 ) c c 5 } | 170 |
| { O C ( C < ) C O C C O c 5 c c c ( C 4 ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c c c 2 c 3 c c c c c 3 4 ) c c 5 , O = S ( = O ) ( c 1 c c c ( N( > ) > ) c c 1) c 2 c c c ( N ( > ) > ) c c 2 } |
| 8 | Santiago et al, 2016[8] | 90D400-10LP | { C C ( C ) ( c 1 c c c ( O C C( O ) C > ) c c 1 ) c 2 c c c ( O C C ( O ) C > ) c c2 , C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C) C O C C ( C ) N ( < ) < } | 60.59 |
| { C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C) C O C C ( C ) N ( < ) < , C C ( C ) ( c 1 c c c ( O C C( O ) C > ) c c 1 ) c 2 c c c ( O C C ( O ) C > ) c c2 } |
| 9 | Santiago et al, 2016[8] | 60D400-10LP | { C C ( C ) ( c 1 c c c ( O C C( O ) C > ) c c 1 ) c 2 c c c ( O C C ( O ) C > ) c c2 , C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C) C O C C ( C ) N ( < ) < } | 86.64 |
| { C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C) C O C C ( C ) N ( < ) < , C C ( C ) ( c 1 c c c ( O C C( O ) C > ) c c 1 ) c 2 c c c ( O C C ( O ) C > ) c c2 } |
| 10 | Santiago et al, 2016[8] | 30D400-10LP | { CCN(<)CCN(CCN(<)<)CCN(<)CCN(CCN(<)CCN(CC)CCN(<)<)CCN(CCN(<)CC)CCN(CC)CCN(<)< , C C ( C ) ( c 1 c c c ( O C C ( O ) > ) c c 1 ) c 2 c c c ( O C C ( O ) > ) c c 2 , C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < } | 117.23 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) > ) c c 1 ) c 2 c c c ( O C C ( O ) > ) c c 2 , CCN(<)CCN(CCN(<)<)CCN(<)CCN(CCN(<)CCN(CC)CCN(<)<)CCN(CCN(<)CC)CCN(CC)CCN(<)< , C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < } |
| { C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) > ) c c 1 ) c 2 c c c ( O C C ( O ) > ) c c 2 , CCN(<)CCN(CCN(<)<)CCN(<)CCN(CCN(<)CCN(CC)CCN(<)<)CCN(CCN(<)CC)CCN(CC)CCN(<)<} |
| { CCN(<)CCN(CCN(<)<)CCN(<)CCN(CCN(<)CCN(CC)CCN(<)<)CCN(CCN(<)CC)CCN(CC)CCN(<)< , C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) > ) c c 1 ) c 2 c c c ( O C C ( O ) > ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) > ) c c 1 ) c 2 c c c ( O C C ( O ) > ) c c 2 , C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < , CCN(<)CCN(CCN(<)<)CCN(<)CCN(CCN(<)CCN(CC)CCN(<)<)CCN(CCN(<)CC)CCN(CC)CCN(<)<} |
| { C C ( C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < ) C O C C ( C ) C O C C ( C ) C O C C ( C ) N ( < ) < , CCN(<)CCN(CCN(<)<)CCN(<)CCN(CCN(<)CCN(CC)CCN(<)<)CCN(CCN(<)CC)CCN(CC)CCN(<)< , C C ( C ) ( c 1 c c c ( O C C ( O ) > ) c c 1 ) c 2 c c c ( O C C ( O ) > ) c c 2 } |
| 11 | Fan et al 2018[9] | EPON-IPD | { C C 1 ( C ) C C ( N ( > ) > ) C C ( C ) ( C N ( > ) > ) C 1 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } | 141 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2, C C 1 ( C ) C C ( N ( > ) > ) C C ( C ) ( C N ( > ) > ) C 1 } |
| 12 | Li et al 2019[10] | UV cured VSMP | { C C ( C O C ( = O ) C ( C ) ( $ ) C $ ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C O C ( = O ) C ( C ) ( $ ) C $ ) c c 1 ) c c 2 } | 150 |
| 13 | Lu et al, 2016[11] | the recyclable epoxy | { O C ( C C ( C C ( O ) O > ) C ( O ) O > ) O > , C C ( C ) ( c 1 c c c ( O C ( O ) C < ) c c 1 ) c 2 c c c ( O C ( O ) C < ) c c 2 } | 64.05 |
| { C C ( C ) ( c 1 c c c ( O C ( O ) C < ) c c 1 ) c 2 c c c ( O C ( O ) C < ) c c 2 , O C ( C C ( C C ( O ) O > ) C ( O ) O > ) O > } |
| 14 | SUN2011[12] | CMMA | { C O C ( = O ) C ( C ) ( $ ) C $ } | 105 |
| 15 | Ortega 2013[13] | tba & PEGDMA 1 | { C C C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ } | 55 |
| { C C ( $ ) ( C $ ) C ( = O ) O C C O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C C C O C ( = O ) C ( C ) ( $ ) C $ } |
| 16 | Qi2008[14] | tba & PEGDMA 2 | { C C C C O C ( = O ) C ( $ ) C $ , C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ } | 49.36 |
| { C C ( = O ) C ( = O ) O C C O C C O C C O C C O C C O C ( = O ) C ( C ) ( $ ) C $ , C C C C O C ( = O ) C ( $ ) C $ } |
| 17 | Wang and Li 2015[2] | Styrene-based SMP | { C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $ , $ C C ( $ ) c 1 c c c c c 1 , $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 } | 20 |
| { $ C C ( $ ) c 1 c c c c c 1 , $ C C ( $ ) c 1 c c c c ( C ( $ ) C $ ) c 1 , C C ( C ) ( C ) C C C C C C ( = O ) O C ( $ ) C $ } |
| 18 | Feng 2020[15] | Feng’s SMP | { O = C ( O C C n 1 c ( = O ) n ( C C O C ( = O ) C ( $ ) C $ ) c ( = O ) n ( C C O C ( = O ) C ( $ ) C $ ) c 1 = O ) C ( $ ) C $ } | 106.579 |
| 19 | Xie and Rousseau2009[16] | REF | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) >} | 94 |
| { C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 20 | Xie and Rousseau2009[16] | DA1 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > , C C C C C C C CC C N ( > ) > } | 76 |
| { C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C C C C C C CC C N ( > ) > } |
| { C C C C C C C CC C N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C C C C C C CC C N ( > ) > , C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > } |
| { C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > , C C C C C C C CC C N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C C C C C C C CC C N ( > ) > , C C ( C O C C ( C ) N ( > ) >) O C C ( C) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 21 | Xie and Rousseau2009[16] | NGDE2 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } | 48.52 |
| { C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > } |
| { C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 22 | Zheng et al. 2015[17] | EPON1 | { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } | 57.99 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } |
| 23 | Rousseau and Xie2010[18] | E75-NGDE | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N >,C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } | 72 |
| { C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2,C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > } |
| { C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N >, C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 24 | Rousseau and Xie2010[18] | E-T403 | { C C C ( C O C C ( C ) O C C ( C ) N > ) ( C O C C ( C ) O C C ( C ) N > ) C O C C ( C ) O C C ( C ) N >, C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } | 75.3 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C C ( C O C C ( C ) O C C ( C ) N > ) ( C O C C ( C ) O C C ( C ) N > ) C O C C ( C ) O C C ( C ) N > } |
| 25 | Xiao et al.2015  [19] | Shape memory polyimide | { O = C 4 [ < ] C ( = O ) c 5 c c ( O c 3 c c c c ( O c2 c c c 1 C ( = O ) [ < ] C ( = O ) c 1 c 2 ) c 3 ) c c c 4 5 , > N c 2 c c c ( O c 1 c c c (N > ) c c 1 ) c c 2 } | 238 |
| { > N c 2 c c c ( O c 1 c c c (N > ) c c 1 ) c c 2 , O = C 4 [ < ] C ( = O ) c 5 c c ( O c 3 c c c c ( O c2 c c c 1 C ( = O ) [ < ] C ( = O ) c 1 c 2 ) c 3 ) c c c 4 5 } |
| 26 | Rimdusit et al., 2013[20] | ENDB 1/1/0.2/0.8 | { C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } | 92.73 |
| { C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4, C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C O C C ( C ) O C C ( C ) O C C ( C ) N > ) N >C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C <, C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c cc ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 27 | Rimdusit et al., 2013[20] | ENDB 1/1/0/1 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } | 120.3 |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 28 | Tanpitaksit2014[21] | BA-a 40 mol% | { C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 , C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } | 138.91 |
| { C C ( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O C c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c c 3 C N ( > ) c 4 c c c c c 4 } |
| 29 | Fejos et al., 2013[22] | ElO2 | { C C C C C C C C C C ( C C C C C C C C ( = O ) O C C ( C O C ( = O ) C C C C C C C C ( C C C ( C C C ( C C C ) O > ) O > ) O > ) O C ( = O ) C C C C C C C C ( C C C ( C C C ( C C C ) O > ) O > ) O > ) O > , C C 1 = C C C 2 C ( C 1 ) C ( O < ) O C 2 O < } | 135 |
| { C C 1 = C C C 2 C ( C 1 ) C ( O < ) O C 2 O < , C C C C C C C C C C ( C C C C C C C C ( = O ) O C C ( C O C ( = O ) C C C C C C C C ( C C C ( C C C ( C C C ) O > ) O > ) O > ) O C ( = O ) C C C C C C C C ( C C C ( C C C ( C C C ) O > ) O > ) O > ) O > } |
| 30 | Feldkamp& Rousseau2010[23] | DER383/EDR-148 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) C C O C C O C C N ( > ) > } | 98.56 |
| { > N ( > ) C C O C C O C C N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 31 | Feldkamp& Rousseau2011[24] | E-230(17)Tba | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C ) N ( > ) > } | 87 |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C ) N ( > ) > } |
| { C C ( C ) ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , C C ( C ) ( C ) N ( > ) > , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } |
| { C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { C C ( C ) ( C ) N ( > ) > , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 32 | Feldkamp& Rousseau2011[24] | D-148(002)M-2005C | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) C C O C C O C C N ( > ) > } | 99 |
| { > N ( > ) C C O C C O C C N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 33 | Rajendran et al., 2013[25] | PTOH | { > c 1 n c ( > ) n c ( > ) n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C 1 C C ( C ( O ) C <) C N 1 < < , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 } | 105 |
| { > c 1 n c ( > ) n c ( > ) n 1 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 } |
| { > c 1 n c ( > ) n c ( > ) n 1 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < } |
| { > c 1 n c ( > ) n c ( > ) n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < } |
| { > c 1 n c ( > ) n c ( > ) n 1 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 ,< O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 } |
| { > c 1 n c ( > ) n c ( > ) n 1 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , > c 1 n c ( > ) n c ( > ) n 1 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , O = C 1 C C ( C ( O ) C < ) C N 1 < < } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , > c 1 n c ( > ) n c ( > ) n 1 } |
| { O = C 1 C C ( C ( O ) C < ) C N 1 < < , > c 1 n c ( > ) n c ( > ) n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 } |
| { O = C 1 C C ( C ( O ) C < ) C N 1 < < ,< O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 } |
| { O = C 1 C C ( C ( O ) C < ) C N 1 < < , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 } |
| { O = C 1 C C ( C ( O ) C < ) C N 1 < < , > c 1 n c ( > ) n c ( > ) n 1 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 } |
| { O = C 1 C C ( C ( O ) C < ) C N 1 < < ,< O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 } |
| { O = C 1 C C ( C ( O ) C < ) C N 1 < < , O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 } |
| {O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < } |
| {O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , O = C 1 C C ( C ( O ) C < ) C N 1 < < } |
| {O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , > c 1 n c ( > ) n c ( > ) n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 } |
| {O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 } |
| {O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , > c 1 n c ( > ) n c ( > ) n 1 } |
| {O = C ( O [ < ] C C C C O [ > ] c 1 c c c ( < ) c c 1 ) c 2 c c c ( < ) c c 2 , O = C 1 C C ( C ( O ) C < ) C N 1 < < , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > > ) c c 1 ) c c 2 , > c 1 n c ( > ) n c ( > ) n 1 } |
| 34 | Wei et al., 2015[26] | A | { C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 , O C ( < ) C 1 C C C C C 1 C ( O ) < } | 113 |
| { O C ( < ) C 1 C C C C C 1 C ( O ) < , C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 } |
| 35 | Wei et al., 2015[26] | E | { C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 , O = C ( O C C ( O ) C > ) C 1 C C ( O ) C ( > ) C C 1 C ( = O ) O C C ( O ) C > , O C ( < ) C 1 C C C C C 1 C ( O ) < } | 143 |
| { O = C ( O C C ( O ) C > ) C 1 C C ( O ) C ( > ) C C 1 C ( = O ) O C C ( O ) C > , C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 , O C ( < ) C 1 C C C C C 1 C ( O ) < } |
| { O C ( < ) C 1 C C C C C 1 C ( O ) < } ,C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 , O = C ( O C C ( O ) C > ) C 1 C C ( O ) C ( > ) C C 1 C ( = O ) O C C ( O ) C >} |
| { C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 , O C ( < ) C 1 C C C C C 1 C ( O ) < , O = C ( O C C ( O ) C > ) C 1 C C ( O ) C ( > ) C C 1 C ( = O ) O C C ( O ) C > } |
| { O = C ( O C C ( O ) C > ) C 1 C C ( O ) C ( > ) C C 1 C ( = O ) O C C ( O ) C > , O C ( < ) C 1 C C C C C 1 C ( O ) < , C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 } |
| { O C ( < ) C 1 C C C C C 1 C ( O ) < } , O = C ( O C C ( O ) C > ) C 1 C C ( O ) C ( > ) C C 1 C ( = O ) O C C ( O ) C > , C C ( C ) ( C 1 C C C ( O C C ( O ) C > ) C C 1 ) C 4 C C C ( O C C ( O ) C O C 3 C C C ( C ( C ) ( C ) C 2 C C C ( C ( O ) C > ) C C 2 ) C C 3 ) C C 4 } |
| 36 | Likitaporn et al.,  2018[27] | BA-a/NGDE | { C C ( C ) ( c 1 c c c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( C O C C ( O ) C > ) C O C C ( O ) C > } | 155.8 |
| { C C ( C ) ( C O C C ( O ) C > ) C O C C ( O ) C > , C C ( C ) ( c 1 c c c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 } |
| 37 | Biju&Nair2014[28] | PPTMO-38 | { C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , O = C ( O [ < ] C C C C O [ > ] C ( = O ) c 1 cc c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c } | 72 |
| { O = C ( O [ < ] C C C C O [ > ] C ( = O ) c 1 cc c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c } |
| { C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , O = C ( O [ < ] C C C C O [ > ] C ( = O ) c 1 cc c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 } |
| { C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , O = C ( O [ < ] C C C C O [ > ] C ( = O ) c 1 cc c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 } |
| { O = C ( O [ < ] C C C C O [ > ] C ( = O ) c 1 cc c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 } |
| { C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , O = C ( O [ < ] C C C C O [ > ] C ( = O ) c 1 cc c ( O < ) c c 1 ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 } |
| 38 | Biju&Nair2014[28] | PPCL-38 | { C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , O = C ( C C C C C O [ < ] C ( = O ) c 1 c c c ( O < ) c c 1 ) [ > ] O C C O C C O [ < ] C ( = O ) C C C C C O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c } | 55 |
| { O = C ( C C C C C O [ < ] C ( = O ) c 1 c c c ( O < ) c c 1 ) [ > ] O C C O C C O [ < ] C ( = O ) C C C C C O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c } |
| { C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , O = C ( C C C C C O [ < ] C ( = O ) c 1 c c c ( O < ) c c 1 ) [ > ] O C C O C C O [ < ] C ( = O ) C C C C C O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 } |
| { C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , O = C ( C C C C C O [ < ] C ( = O ) c 1 c c c ( O < ) c c 1 ) [ > ] O C C O C C O [ < ] C ( = O ) C C C C C O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 } |
| { O = C ( C C C C C O [ < ] C ( = O ) c 1 c c c ( O < ) c c 1 ) [ > ] O C C O C C O [ < ] C ( = O ) C C C C C O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 } |
| { C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , O = C ( C C C C C O [ < ] C ( = O ) c 1 c c c ( O < ) c c 1 ) [ > ] O C C O C C O [ < ] C ( = O ) C C C C C O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 } |
| 39 | Biju&Nair2014[28] | PPPG-38\_ | { C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C [ < ] O C ( = O ) c 1 c c c ( O < ) c c 1 ) O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c } | 128 |
| { C C ( C [ < ] O C ( = O ) c 1 c c c ( O < ) c c 1 ) O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c } |
| { C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C [ < ] O C ( = O ) c 1 c c c ( O < ) c c 1 ) O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 } |
| { C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , , C C ( C [ < ] O C ( = O ) c 1 c c c ( O < ) c c 1 ) O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 } |
| { C C ( C [ < ] O C ( = O ) c 1 c c c ( O < ) c c 1 ) O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 } |
| { C C ( C ) ( c 1 c c c ( N C ( = O ) > ) c c 1 ) c 2 c c c ( N C ( = O ) > ) c c , C C ( C [ < ] O C ( = O ) c 1 c c c ( O < ) c c 1 ) O [ > ] C ( = O ) c 2 c c c ( O < ) c c 2 , C C ( C ) ( c 3 c c c ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C < ) O ) c c 1 ) c c 2 ) c c 3 ) c 4 c c c ( O C C ( C < ) O ) c c 4 } |
| 40 | Sunitha et al., 2013[29] | BA–PN | { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > ) c c 1 ) c c 2 , O C ( C < ) C n 1 c c ( C > > ) n n 1 , < < O c 1 c ( C < < < ) c c c c 1 C > > > } | 37 |
| { O C ( C < ) C n 1 c c ( C > > ) n n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > ) c c 1 ) c c 2 , < < O c 1 c ( C < < < ) c c c c 1 C > > > } |
| { < < O c 1 c ( C < < < ) c c c c 1 C > > >, < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > ) c c 1 ) c c 2 , O C ( C < ) C n 1 c c ( C > > ) n n 1 } |
| { < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > ) c c 1 ) c c 2 , < < O c 1 c ( C < < < ) c c c c 1 C > > > , O C ( C < ) C n 1 c c ( C > > ) n n 1 } |
| { O C ( C < ) C n 1 c c ( C > > ) n n 1 , < < O c 1 c ( C < < < ) c c c c 1 C > > > , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > ) c c 1 ) c c 2 } |
| { < < O c 1 c ( C < < < ) c c c c 1 C > > > , O C ( C < ) C n 1 c c ( C > > ) n n 1 , < O c 2 c c c ( C ( [ M e ] ) ( [ M e ] ) c 1 c c c ( O > ) c c 1 ) c c 2 } |
| 41 | Liu et al., 2010[30] | EP-60 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , > N ( > ) c 2 c c c ( C c 1 c c c ( N ( > ) > ) c c 1 ) c c 2 } | 74.84 |
| { > N ( > ) c 2 c c c ( C c 1 c c c ( N ( > ) > ) c c 1 ) c c 2, C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| 42 | Tanpitaksit et al., 2015[31] | benzoxazine resin | { C C ( C ) ( c 2 c c c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( C O C C ( O ) C > ) C O C C ( O ) C > } | 141 |
| { C C ( C ) ( C O C C ( O ) C > ) C O C C ( O ) C > , C C ( C ) ( c 2 c c c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } |
| 43 | Leonardi et al., 2011[32] | DGEBA/DA/MXDA | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C C C C C C C C C C C N ( > ) > , > N ( > ) C c 1 c c c c ( C N ( > ) > ) c 1 } | 55.6 |
| { C C C C C C C C C C C C N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , > N ( > ) C c 1 c c c c ( C N ( > ) > ) c 1 } |
| { > N ( > ) C c 1 c c c c ( C N ( > ) > ) c 1 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C C C C C C C C C C C N ( > ) > } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , > N ( > ) C c 1 c c c c ( C N ( > ) > ) c 1 , C C C C C C C C C C C C N ( > ) > } |
| { C C C C C C C C C C C C N ( > ) > , > N ( > ) C c 1 c c c c ( C N ( > ) > ) c 1 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { > N ( > ) C c 1 c c c c ( C N ( > ) > ) c 1 , C C C C C C C C C C C C N ( > ) > , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| 44 | Song et al., 2011  [33] | #6 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 , > N ( > ) c 1 c c c c ( N ( > ) > ) c 1 } | 101 |
| { > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) c 1 c c c c ( N ( > ) > ) c 1 } |
| { > N ( > ) c 1 c c c c ( N ( > ) > ) c 1 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) c 1 c c c c ( N ( > ) > ) c 1 , > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 } |
| { > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 , > N ( > ) c 1 c c c c ( N ( > ) > ) c 1 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| { > N ( > ) c 1 c c c c ( N ( > ) > ) c 1 , > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 } |
| 45 | Grishchuk et al., 2013[34] | DGEBA | { C C ( C ) ( c 1 c c c ( O C C ( O ) C $ ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C $ ) c c 2 ) c c 3 ) c c 4 } | 170 |
| 46 | Grishchuk et al., 2013[34] | DGEBA/BOX/ETEB | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c 3 c c c c c 3 ) c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C < ) c c 3 ) c c 4 } | 156 |
| { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C < ) c c 3 ) c c 4 } |
| { ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C < ) c c 3 ) c c 4, C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c 3 c c c c c 3 ) c 4 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C < ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c 3 c c c c c 3 ) c 4 } |
| { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c 3 c c c c c 3 ) c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C < ) c c 3 ) c c 4C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C < ) c c 3 ) c c 4, C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| 47 | Grishchuk et al., 2013[34] | DGEBA/BOX | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > )c3ccccc3)c4} | 165 |
| { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| 48 | Grishchuk et al., 2013[34] | TGPAP-Ref | { O C ( C $ ) C O c 1 c c c ( N ( C C ( O ) C $ ) C C ( O ) C $ ) c c 1 } | 210 |
| 49 | Grishchuk et al., 2013[34] | TGPAP/BOX | { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 } | 175 |
| { O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ,C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 } |
| 50 | Grishchuk et al., 2013[34] | TGPAP/BOX/ETB | {C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 } | 163 |
| { O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 } |
| { ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 } |
| {C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 } |
| { O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 } |
| { ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , , O C ( C < ) C O c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 } |
| 51 | Grishchuk et al., 2013[34] | TGDDM | { O C ( C $ ) C N ( C C ( O ) C $ ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C $ ) C C ( O ) C $ ) c c 1 ) c c 2 | 210 |
| 52 | Grishchuk et al., 2013[34] | TGDDM/BOX  TGDDM/BOX | { O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C< ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 } | 196  196 |
| { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 } |
| 53 | Grishchuk et al., 2013[34] | TGDDM/BOX/ETBN | { O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 } | 187 |
| { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 } |
| { ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 } |
| { O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 } |
| { C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 } |
| { ( C C C C C C ( = O ) O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C > ) c c 1 ) c c 2 ) C ( = O ) O C C ( O ) C O c 4 c c c ( C ( C ) ( C ) c 3 c c c ( O C C ( O ) C > ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c c ( O ) c ( C N ( > ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( > ) c 3 c c c c c 3 ) c 4 , O C ( C < ) C N ( C C ( O ) C < ) c 2 c c c ( c 1 c c c ( N ( C C ( O ) C < ) C C ( O ) C < ) c c 1 ) c c 2 } |
| 54 | Grishchuk et al., 2013[34] | BOX-ref | { C C ( C ) ( c 2 c c c ( O ) c ( C N ( $ ) c 1 c c c c c 1 ) c 2 ) c 4 c c c ( O ) c ( C N ( $ ) c 3 c c c c c 3 ) c 4 } | 196 |
| 55 | Zhao et al., 2016[35] | PCLDA /tetrathiol crosslinker | { O = C ( C C C C C O C ( = O ) C ( > ) > ) O C C O C ( = O ) C C C C C O C ( = O ) C ( > ) > , O = C ( C C S < ) O C C ( C O C C C S < ) ( C O C ( = O ) C C S < ) C O C ( = O ) C C S < } | 24 |
| { O = C ( C C S < ) O C C ( C O C C C S < ) ( C O C ( = O ) C C S < ) C O C ( = O ) C C S < , O = C ( C C C C C O C ( = O ) C ( > ) > ) O C C O C ( = O ) C C C C C O C ( = O ) C ( > ) > } |
| 56 | Altuna et al., 2016 [36] | CS11 | { C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 , C C ( = O ) C ( O ) ( C C ( = O ) O < ) C C ( = O ) O < , O = C ( C C C C C C C C C ( = O ) O < ) O } | 72.4 |
| { C C ( = O ) C ( O ) ( C C ( = O ) O < ) C C ( = O ) O < , C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 , O = C ( C C C C C C C C C ( = O ) O < ) O } |
| { O = C ( C C C C C C C C C ( = O ) O < ) O , C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 , C C ( = O ) C ( O ) ( C C ( = O ) O < ) C C ( = O ) O < } |
| { C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 , O = C ( C C C C C C C C C ( = O ) O < ) O , C C ( = O ) C ( O ) ( C C ( = O ) O < ) C C ( = O ) O < } |
| { C C ( = O ) C ( O ) ( C C ( = O ) O < ) C C ( = O ) O < , O = C ( C C C C C C C C C ( = O ) O < ) O , C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 } |
| { O = C ( C C C C C C C C C ( = O ) O < ) O , C C ( = O ) C ( O ) ( C C ( = O ) O < ) C C ( = O ) O < , C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 } |
| 57 | Altuna et al., 2016[36] | S20 | { C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 , O = C ( C C C C C C C C C ( = O ) O < ) O < } | 73.08 |
| { O = C ( C C C C C C C C C ( = O ) O < ) O < , C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 } |
| 58 | Altuna et al., 2016[36] | G15 | { C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 , O = C ( C C C C ( = O ) O < ) O < } | 77.3 |
| { O = C ( C C C C ( = O ) O < ) O < , C C ( C ) ( O C C ( O ) C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c 3 c c c ( O C C ( O ) C < ) c c 3 } |
| 59 | Ma et al., 2017[37] | MDS-EPO | { O C ( C < ) C O C 3 C O C 4 C ( O C C ( O ) C O C 1 C O C 2 C ( O C C ( O ) C < ) C O C 1 2 ) C O C 3 4 , > N ( > ) c 2 c c c ( S S c 1 c c c ( N ( > ) > ) c c 1 ) c c 2 } | 40.6 |
| { > N ( > ) c 2 c c c ( S S c 1 c c c ( N ( > ) > ) c c 1 ) c c 2 , O C ( C < ) C O C 3 C O C 4 C ( O C C ( O ) C O C 1 C O C 2 C ( O C C ( O ) C < ) C O C 1 2 ) C O C 3 4 } |
| 60 | Ma et al., 2017[37] | MDA-EPO | { > N ( > ) c 2 c c c ( C c 1 c c c ( N ( > ) > ) c c 1 ) c c 2 , O C ( C < ) C O C 3 C O C 4 C ( O C C ( O ) C O C 1 C O C 2 C ( O C C ( O ) C < ) C O C 1 2 ) C O C 3 4 } | 37.3 |
| { O C ( C < ) C O C 3 C O C 4 C ( O C C ( O ) C O C 1 C O C 2 C ( O C C ( O ) C < ) C O C 1 2 ) C O C 3 4 , > N ( > ) c 2 c c c ( C c 1 c c c ( N ( > ) > ) c c 1 ) c c 2 } |
| 61 | Fan et al., 2014[38] | EP06(0) | { C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , O = C ( O > ) C 1 C C C C C 1 C ( = O ) O > } | 80.73 |
| { O = C ( O > ) C 1 C C C C C 1 C ( = O ) O > , C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 } |
| Fan et al., 2014[38] | EP06(25) | { C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , C C ( C ) ( c 1 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 2 , O = C ( O > )C 1 C C C C C 1 C ( = O ) O > } | 95 |
| { C C ( C ) ( c 1 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 2 , C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , O = C ( O > )C 1 C C C C C 1 C ( = O ) O > } |
| { O = C ( O > ) C 1 C C C C C 1 C ( = O ) O > ,C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , C C ( C ) ( c 1 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , O = C ( O > )C 1 C C C C C 1 C ( = O ) O > , C C ( C ) ( c 1 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 2 , O = C ( O > )C 1 C C C C C 1 C ( = O ) O > , C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 } |
| { O = C ( O > ) C 1 C C C C C 1 C ( = O ) O > , C C ( C ) ( c 1 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C O C C O C C ( O ) C < ) c c 2 , C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 } |
| 62 | Fan et al., 2015[39] | DGEBAPO-2/MPDA | { C C ( C C C N ( > ) > ) C N ( > ) > , C C ( C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C ) O C C ( O ) C < ) c c 1 ) c c 2 ) O C C ( O ) C < } | 58.65 |
| { C C ( C O c 2 c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( C ) O C C ( O ) C < ) c c 1 ) c c 2 ) O C C ( O ) C < , C C ( C C C N ( > ) > ) C N ( > ) > } |
| 63 | Guo et al., 2015b[40] | LCD/DDM | { C C C C C C C C O C ( = O ) c 3 c c ( C ( = O ) O c 2 c c c ( O C ( = O ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c c c 3 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 } | 123.49 |
| { C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 , C C C C C C C C O C ( = O ) c 3 c c ( C ( = O ) O c 2 c c c ( O C ( = O ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c c 2 ) c c c 3 O C C ( O ) C < } |
| 64 | Guo et al., 2015a[41] | (2)/DDM | { C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 } | 178 |
| { C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < } |
| 65 | Guo et al., 2015a[41] | (2)/(1)5:5/DDM | { C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1) c 2 c c c ( N ( > ) > ) c c 2 } | 169 |
| { C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1) c 2 c c c ( N ( > ) > ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < } |
| { C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1) c 2 c c c ( N ( > ) > ) c c 2 , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < } |
| { C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1) c 2 c c c ( N ( > ) > ) c c 2 , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < } |
| { C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ( C ) ( C ) C ) c 1 ) c c ( C ( C ) ( C ) C ) c 2 O C C ( O ) C < , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < } |
| 66 | Guo at al., 2015a[41] | (1)/DDM  (1)/DDM | { C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 } | 160 |
| { C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 , C c 2 c c ( c 1 c c ( C ) c ( O C C ( O ) C < ) c ( C ) c 1 ) c c ( C ) c 2 O C C ( O ) C < } |
| 67 | Ariraman et al., 2015[42] | BCC/DGEBA | { C C ( C ) ( c 1 c c c ( O C C ( P ) C O P ) c c 1 ) c 2 c c c ( O C C ( < ) O C < ) c c 2 , < < c 3 c c c ( C C 2 C C C C ( C c 1 c c c ( O C ( > ) N > ) c c 1 ) C 2 ) c c 3 , > > O c 1 n c ( O > > ) n c ( O > > ) n 1 } | 113.2 |
| { < < c 3 c c c ( C C 2 C C C C ( C c 1 c c c ( O C ( > ) N > ) c c 1 ) C 2 ) c c 3 , C C ( C ) ( c 1 c c c ( O C C ( P ) C O P ) c c 1 ) c 2 c c c ( O C C ( < ) O C < ) c c 2 , > > O c 1 n c ( O > > ) n c ( O > > ) n 1 } |
| { > > O c 1 n c ( O > > ) n c ( O > > ) n 1 , C C ( C ) ( c 1 c c c ( O C C ( P ) C O P ) c c 1 ) c 2 c c c ( O C C ( < ) O C < ) c c 2 , < < c 3 c c c ( C C 2 C C C C ( C c 1 c c c ( O C ( > ) N > ) c c 1 ) C 2 ) c c 3 } |
| { C C ( C ) ( c 1 c c c ( O C C ( P ) C O P ) c c 1 ) c 2 c c c ( O C C ( < ) O C < ) c c 2 , > > O c 1 n c ( O > > ) n c ( O > > ) n 1 , < < c 3 c c c ( C C 2 C C C C ( C c 1 c c c ( O C ( > ) N > ) c c 1 ) C 2 ) c c 3 } |
| { < < c 3 c c c ( C C 2 C C C C ( C c 1 c c c ( O C ( > ) N > ) c c 1 ) C 2 ) c c 3 , > > O c 1 n c ( O > > ) n c ( O > > ) n 1 , C C ( C ) ( c 1 c c c ( O C C ( P ) C O P ) c c 1 ) c 2 c c c ( O C C ( < ) O C < ) c c 2 } |
| { > > O c 1 n c ( O > > ) n c ( O > > ) n 1 , < < c 3 c c c ( C C 2 C C C C ( C c 1 c c c ( O C ( > ) N > ) c c 1 ) C 2 ) c c 3 , C C ( C ) ( c 1 c c c ( O C C ( P ) C O P ) c c 1 ) c 2 c c c ( O C C ( < ) O C < ) c c 2 } |
| 68 | Grishchuk et al., 2011[43] | EP(DETA)-Ref | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < } | 135 |
| { < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| 69 | Grishchuk et al., 2011[43] | CS11 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } | 155 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| 70 | Grishchuk et al., 2011[43] | EP(DDM)-Ref | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } | 171.252 |
| { < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| 71 | Grishchuk et al., 2011[43] | EP(DETA)/BOX75/25 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O )c ( C N ( < ) c 3 c c c c c 3 ) c 4 } | 132 |
| { < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4, C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O )c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4, , < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| 72 | Grishchuk et al., 2011[43] | EP(DETA/DDM)/BOX75/25 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } | 133 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } , < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 ,< N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } |
| { < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } |
| {< N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| { < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| { < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) <, < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) c 2 c c c ( C c 1 c cc (N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) C C N ( < ) C C N ( < ) < , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) c 2 c c c ( C c 1 c cc (N ( < ) < ) c c 1 ) c c 2 , < N ( < ) C C N ( < ) C C N ( < ) < , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| 73 | Grishchuk et al., 2011[43] | TGPAP/BOX/ETBN | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } | 158 |
| { < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 } |
| { < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| { C C ( C ) ( c 2 c c ( < ) c ( O ) c ( C N ( < ) c 1 c c c c c 1 ) c 2 ) c 4 c c ( < ) c ( O ) c ( C N ( < ) c 3 c c c c c 3 ) c 4 , < N ( < ) c 2 c c c ( C c 1 c c c ( N ( < ) < ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C ( O ) C > ) c c 2 ) c c 3 ) c c 4 } |
| 74 | Zhao et al., 2015[44] | E51/4,4’-Methylenedianiline/NGDE/KH-560 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } | 347.25 |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C} |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 } |
| { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 } |
| { C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C } |
| { C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C } |
| { C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < } |
| { C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 } |
| { C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 } |
| { C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C } |
| { C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C } |
| { C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 } |
| { C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 } |
| { C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| { C C( C ) ( C O C C ( O ) C < ) C O C C ( O ) C < , C O [ Si ] ( C C C O C C ( O ) C < )( O C ) O C , C N ( > ) c 2 c c c ( C c 1 c c c ( N ( C ) > ) c c 1 ) c c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 4 c c c ( O C C ( O ) C O c 3 c c c ( C ( C ) ( C ) c 2 c c c ( O C C ( O ) C < ) c c 2 ) c c 3 ) c c 4 } |
| 75 | Lin&Chen, 1999[45] | PBAG-based PU | { $ O C N c 2 c c c c ( C c 1 c c c c ( N C O $ ) c 1 ) c 2 , $ O C C C C O $ } | 49 |
| { $ O C C C C O $ , $ O C N c 2 c c c c ( C c 1 c c c c ( N C O $ ) c 1 ) c 2 } |
| 76 | Park et al., 2004[46] | G25D15 | { O = C ( O > ) c 1 c c c ( C ( = O) O > ) c c 1 , < O C C O <, < O [ < ] C C O [ > ] < , O = C ( > ) c 1 c c ( C ( = O ) > ) c c ( S ( O ) ( O ) O ) c 1 } | 45.2 |
| { < O C C O <, < O [ < ] C C O [ > ] < , O = C ( O > ) c 1 c c c ( C ( = O) O > ) c c 1 , O = C ( > ) c 1 c c ( C ( = O ) > ) c c ( S ( O ) ( O ) O ) c 1 } |
| { O = C ( > ) c 1 c c ( C ( = O ) > ) c c ( S ( O ) ( O ) O ) c 1 , O = C ( O > ) c 1 c c c ( C ( = O) O > ) c c 1 , < O C C O <, < O [ < ] C C O [ > ] < } |
| { O = C ( O > ) c 1 c c c ( C ( = O) O > ) c c 1 , O = C ( > ) c 1 c c ( C ( = O ) > ) c c ( S ( O ) ( O ) O ) c 1 , < O C C O <, < O [ < ] C C O [ > ] < } |
| { < O C C O <, < O [ < ] C C O [ > ] < , O = C ( > ) c 1 c c ( C ( = O ) > ) c c ( S ( O ) ( O ) O ) c 1 , O = C ( O > ) c 1 c c c ( C ( = O) O > ) c c 1 } |
| { O = C ( > ) c 1 c c ( C ( = O ) > ) c c ( S ( O ) ( O ) O ) c 1 , < O [ < ] C C O [ > ] < , O = C ( O > ) c 1 c c c ( C ( = O) O > ) c c 1 , < O C C O < } |
| 77 | Liu2006[30] | P(MMA-co-VP)-PEG1000 | { C C ( $ ) ( $ ) N 1 C C C C 1 = O , C O C ( = O ) C ( C ) C ( C ) ( $ ) $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) C $ , $ [ < ] C C O [ > ] O $ }  { C C ( $ ) ( C $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) C $, C C ( $ ) ( $ ) N 1 C C C C 1 = O , C O C ( = O ) C ( C ) C ( C ) ( $ ) $ , $ [ < ] C C O [ > ] O $ }  { $ [ < ] C C O [ > ] O $ , C C ( $ ) ( $ ) N 1 C C C C 1 = O , C O C ( = O ) C ( C ) C ( C ) ( $ ) $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) C $ }  { C C ( $ ) ( $ ) N 1 C C C C 1 = O , C O C ( = O ) C ( C ) C ( C ) ( $ ) $ , $ [ < ] C C O [ > ] O $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) C $ }  { C C ( $ ) ( C $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) C $, C C ( $ ) ( $ ) N 1 C C C C 1 = O , $ [ < ] C C O [ > ] O $, C O C ( = O ) C ( C ) C ( C ) ( $ ) $ }  { $ [ < ] C C O [ > ] O $ , C C ( $ ) ( C $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) C $ , C C ( $ ) ( $ ) N 1 C C C C 1 = O , C O C ( = O ) C ( C ) C ( C ) ( $ ) $ } | 72 |
| **Testing data** | | | | |
| 78 | Nair et al., 2010[47] | TMPTMP/TATATO | { C C C ( C O C ( = O ) C C S < ) ( C O C ( = O ) C C S < ) O C ( = O ) C C S < , O = c 1 n ( C C ( > ) > ) c ( =O ) n ( C C ( > ) > ) c ( = O ) n 1 C C ( > ) > } | 33.99 |
| 79 | Barszczewska-Rybarek et al., 2017[48] | MMA+TEGDMA | { C C ( $ ) ( $ ) C ( = O ) O [ < ] C C O [ > ] C ( = O ) C ( C ) ( $ ) $ , C O C ( = O ) C ( C ) C ( C ) ( $ ) $ } | 108 |
| 80 | Liu et al., 2006[49] | P(MMA-co-VP) | { C O C ( = O ) C ( C ) C ( C ) ( $ ) $ , C C ( $ ) ( $ ) N 1 C C C C 1 = O , C C ( $ ) ( $ ) C ( = O ) O C C O C ( = O ) C ( C ) ( $ ) $ } | 125.86 |
| 81 | Li et al., 1998[50] | Ir-PE | { > [ < ] C C [>]>} | 118.6 |
| 82 | Xu et al., 2006[51] | HYPU0-1 | { O = C ( C C < ) O C > > , C C O [ Si ] ( C C C N ( < < ) < < ) ( O C C ) O C C , C C 1 ( C ) C C ( N C ( = O ) > ) C C C 1 ( C ) C N C ( = O ) > } | 57 |
| 83 | Xu et al., 2006[51] | HYPU1-4 | { O = C ( C C < ) O C > > , C C 1 ( C ) C C ( N C ( = O ) > ) C C C 1 ( C ) C N C ( = O ) > , C C O [ Si ] ( C C C N ( << ) << ) ( O C C ) O C C , < O C C O C C O C C O C C O C C O C C O C C O C C O C C O C C O < } | 51.1 |
| 84 | Yakacki et al., 2007[52] | PEGDMA/MMA | { C C ( C ) ( C ) O C ( = O ) C C ( $ ) $ , C C ( $ ) ( $ ) C ( = O ) O [ < ] C C O [ > ] C ( = O ) C ( C ) ( $ ) $ , C C ( $ ) ( $ ) C ( = O ) O C C O C C O C ( = O ) C ( C ) ( $ ) $ } | 52 |
| 85 | Yakacki et al., 2008[3] | PEGDMA/MMA | { C C ( $ ) ( $ ) C ( = O ) O [ < ] C C O [ > ] C ( = O ) C ( C ) ( $ ) $ , C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ } | 52 |
| 86 | Jo et al., 2019[53] | ESMP-0-19 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 } | 125.5 |
| 87 | Jo et al., 2019[53] | ESMP-10-21 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c , C C ( C ) ( c 1 c c c ( N ( > ) > ) c c 1 ) c 2 c c c ( N ( > ) > ) c c 2 , C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 } | 137.42 |
| 88 | Fan et al., 2013[54] | EPD230(0) | { C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , C C 1 ( C ) C C ( C ) ( C N ( > ) > ) C C ( C ) ( N ( > ) > ) C 1 } | 86.3 |
| 89 | Fan, et al., 2013[54] | EPD230(20) | { C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > , C C 1 ( C ) C C ( C ) ( C N ( > ) > ) C C ( C ) ( N ( > ) > ) C 1 } | 75.12 |
| 90 | Fan et al., 2013[54] | EPD230(100) | { C C ( C ) ( c 1 c c c ( O C C O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C O C C ( O ) C < ) c c 2 , C C ( C O C C ( C ) N ( > ) > ) O C C ( C ) O C C ( C ) N ( > ) > } | 46.57 |
| 91 | Willams et al., 2011[55] | EPON828/EPON862/Epikure W | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , O C ( C < ) C O c 2 c c c ( C c 1 c c c c ( O C C ( O ) C < ) c 1 ) c c 2 , C C c 1 c c ( C ) c ( N ( > ) > ) c ( C C) c 1 N ( > ) > } | 171.89 |
| 92 | Tanpitaksit et al., 2014[56] | NGDE/BA-a | { O C ( C < ) C O c 2 c c c ( C c 1 c c c c ( O C C ( O ) C < ) c 1 ) c c 2 , C C ( C ) ( c 3 c c c ( O [ < ] c 2 c c c c ( C ( C ) ( C ) c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 ) c c 3 ) c 4 c c c ( [ > ] O C C ( O ) C < ) c c 4 , C C c 1 c c ( C ) c ( N ( > ) > ) c ( C C ) c 1 N ( > ) > } | 139.36 |
| 93 | Arnebold et al., 2016[57] | Pure epoxide | { O = C ( O C C 1 C C C ( O $ ) C ( O $ ) C 1 ) C 2 C C C ( O $ ) C ( O $ ) C 2 } | 169 |
| 94 | Song et al., 2011[33] | #3 | { C C ( C ) ( c 1 c c c ( O C C ( O ) C < ) c c 1 ) c 2 c c c ( O C C ( O ) C < ) c c 2 , > N ( > ) c 2 c c c ( C c 1 c c c c ( N ( > ) > ) c 1 ) c c 2 } | 133 |
| 95 | Hassan et al., 2016[58] | 33 Bis A | { O = S ( = O ) ( c 1 c c c c ( N ( < ) < ) c 1 ) c 2 c c c c ( N ( < ) < ) c 2 , C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) c c 1 ) c 2 c c c ( O C C ( O ) C > ) c c 2 } | 187 |
| 96 | Hassan et al., 2016[58] | 44 Bis A | { C C ( C ) ( c 1 c c c ( O C C ( O ) C > ) cc 1 ) c 2 c c c ( O C C ( O ) C > ) c c 2 , O = S ( = O ) ( c 1 c c c ( N ( < ) < ) c c 1 ) c 2 c c c ( N ( < ) < ) c c 2 } | 219 |
| 97 | Hearon et al., 2015[59] | TMPAE,3-MPD,TMHDI,TMPTMP | { C C ( C N C ( = O ) < ) C C ( C) ( C ) C C N C ( = O ) < , C C C ( C O C ( = O ) C C S > > ) ( C O C ( = O ) C C S < ) O C ( = O ) C C S > > , C C ( C C O > ) C C O > , C C C ( C O > ) ( C O > ) O C C C < < } | 50 |
| 98 | Hearon et al., 2015[59] | TMPAE,DEG,TMHDI,3-Ti | { < O C C O C C O < , O = c 1 n ( C C S > > ) c ( = O ) n ( C C S > > ) c ( = O ) n 1 C C S > > , C C (C N C ( = O ) > ) C C ( C ) ( C ) C C N C ( = O ) > , C C C ( C O < ) ( C O < ) O C C C < < } | 40 |
| 99 | Hearon et al., 2015[59] | TMPAE,CHDM,TMHDI,3-Ti | { < O C C 1 C C C C ( C O < ) C 1 , C C C ( C O < )( C O < ) O C C C < < , C C ( C N C ( = O ) > ) C C ( C ) ( C ) C C N C ( = O ) > , O =c 1 n ( C C S > > ) c ( = O ) n ( C C S > > ) c ( = O ) n 1 C C S > > } | 68 |
| 100 | Choong et al., 2016[60] | DEGDA+tBA | { O = C ( C C O C C O C ( = O ) C ( $ ) C $ ) C ( $ ) C $ , C C ( C ) ( C ) O C ( = O ) C ( $ ) C $ } | 54 |

**Reference**

[1] F. Castro, K.K. Westbrook, K.N. Long, R. Shandas, H.J. Qi, Effects of thermal rates on the thermomechanical behaviors of amorphous shape memory polymers, Mech. Time-Dependent Mater. 14 (2010) 219–241. https://doi.org/10.1007/s11043-010-9109-6.

[2] Z. Wang, Q. Lv, S. Chen, C. Li, S. Sun, S. Hu, Glass transition investigations on highly crosslinked epoxy resins by molecular dynamics simulations, Mol. Simul. 41 (2015) 1515–1527. https://doi.org/10.1080/08927022.2014.998213.

[3] C.M. Yakacki, R. Shandas, D. Safranski, A.M. Ortega, K. Sassaman, K. Gall, Strong, tailored, biocompatible shape-memory polymer networks, Adv. Funct. Mater. 18 (2008) 2428–2435. https://doi.org/10.1002/adfm.200701049.

[4] N. Lakhera, C. Yakacki, T.D. Nguyen, C. Frick, Partially constrained recovery of (meth)acrylate shape-memory polymer networks, J. Appl. Polym. Sci. 126 (2012) 72–82. https://doi.org/10.1002/app.

[5] J. Cui, K. Kratz, A. Lendlein, Adjusting shape-memory properties of amorphous polyether urethanes and radio-opaque composites thereof by variation of physical parameters during programming, Smart Mater. Struct. 19 (2010). https://doi.org/doi.org/10.1088/0964-1726/19/6/065019.

[6] J.S. Arrieta, J. Diani, P. Gilormini, Cyclic and monotonic testing of free and constrained recovery properties of a chemically crosslinked acrylate, J. Appl. Polym. Sci. 131 (2014) 1–8. https://doi.org/10.1002/app.39813.

[7] X. Wu, X. Yang, Y. Zhang, W. Huang, A new shape memory epoxy resin with excellent comprehensive properties, J. Mater. Sci. 51 (2016) 3231–3240. https://doi.org/10.1007/s10853-015-9634-4.

[8] D. Santiago, A. Fabregat-Sanjuan, F. Ferrando, S. De la Flor, Improving of Mechanical and Shape-Memory Properties in Hyperbranched Epoxy Shape-Memory Polymers, Shape Mem. Superelasticity. 2 (2016) 239–246. https://doi.org/10.1007/s40830-016-0067-y.

[9] J. Fan, G. Li, High enthalpy storage thermoset network with giant stress and energy output in rubbery state, Nat. Commun. 9 (2018) 642. https://doi.org/10.1038/s41467-018-03094-2.

[10] A. Li, A. Challapalli, G. Li, 4D Printing of Recyclable Lightweight Architectures Using High Recovery Stress Shape Memory Polymer, Sci. Rep. 9 (2019) 7621. https://doi.org/10.1038/s41598-019-44110-9.

[11] L. Lu, G. Li, One-Way Multishape-Memory Effect and Tunable Two-Way Shape Memory Effect of Ionomer Poly(ethylene-co-methacrylic acid), ACS Appl. Mater. Interfaces. 8 (2016) 14812–14823. https://doi.org/10.1021/acsami.6b04105.

[12] L. Sun, W.M. Huang, C.C. Wang, Y. Zhao, Z. Ding, H. Purnawali, Optimization of the shape memory effect in shape memory polymers, J. Polym. Sci. Part A Polym. Chem. 49 (2011) 3574–3581. https://doi.org/10.1002/pola.24794.

[13] A.M. Ortega, C.M. Yakacki, S.A. Dixon, R. Likos, A.R. Greenberg, K. Gall, Effect of crosslinking and long-term storage on the shape-memory behavior of (meth)acrylate-based shape-memory polymers, Soft Matter. 8 (2012) 7381–7392. https://doi.org/10.1039/c2sm25298h.

[14] H.J. Qi, T.D. Nguyen, F. Castro, C.M. Yakacki, R. Shandas, Finite deformation thermo-mechanical behavior of thermally induced shape memory polymers, J. Mech. Phys. Solids. 56 (2008) 1730–1751. https://doi.org/10.1016/j.jmps.2007.12.002.

[15] X. Feng, G. Li, Feng’s polymer, (In Prep. (2020).

[16] T. Xie, I.A. Rousseau, Facile tailoring of thermal transition temperatures of epoxy shape memory polymers, Polymer (Guildf). 50 (2009) 1852–1856. https://doi.org/10.1016/j.polymer.2009.02.035.

[17] N. Zheng, G. Fang, Z. Cao, Q. Zhao, T. Xie, High strain epoxy shape memory polymer, Polym. Chem. 6 (2015) 3046–3053. https://doi.org/10.1039/c5py00172b.

[18] I.A. Rousseau, T. Xie, Shape memory epoxy: Composition, structure, properties and shape memory performances, J. Mater. Chem. 20 (2010) 3431–3441. https://doi.org/10.1039/b923394f.

[19] X. Xiao, D. Kong, X. Qiu, W. Zhang, Y. Liu, S. Zhang, F. Zhang, Y. Hu, J. Leng, Shape memory polymers with high and low temperature resistant properties, Sci. Rep. 5 (2015) 1–12. https://doi.org/10.1038/srep14137.

[20] S. Rimdusit, M. Lohwerathama, K. Hemvichian, P. Kasemsiri, I. Dueramae, Shape memory polymers from benzoxazine-modified epoxy, Smart Mater. Struct. 22 (2013). https://doi.org/doi.org/10.1088/0964-1726/22/7/075033.

[21] T. Tanpitaksit, M. Okhawilai, S. Rimdusit, Shape Fixity and Shape Recovery of Shape Memory Polymer, J. Met. Mater. Miner. 24 (2014) 43–47.

[22] M. Fejos, J. Karger-Kocsis, S. Grishchuk, Effects of fibre content and textile structure on dynamic-mechanical and shape-memory properties of ELO/flax biocomposites, J. Reinf. Plast. Compos. 32 (2013) 1879–1886. https://doi.org/10.1177/0731684413497277.

[23] D.M. Feldkamp, I.A. Rousseau, Effect of the deformation temperature on the shape-memory behavior of epoxy networks, Macromol. Mater. Eng. 295 (2010) 726–734. https://doi.org/10.1002/mame.201000035.

[24] D.M. Feldkamp, I.A. Rousseau, Effect of chemical composition on the deformability of shape-memory epoxies, Macromol. Mater. Eng. 296 (2011) 1128–1141. https://doi.org/10.1002/mame.201100066.

[25] B. Rajendran, K.S. Santhosh Kumar, R.S. Rajeev, C.P. Reghunadhan Nair, Epoxy-cyanate ester shape memory thermoset: Some aspects of phase transition, viscoelasticity and shape memory characteristics, Polym. Adv. Technol. 24 (2013) 623–629. https://doi.org/10.1002/pat.3124.

[26] K. Wei, B. Ma, Y. Liu, H. Wang, N. Li, An investigation on shape memory behaviors of epoxy resin system, J. Mater. Res. 30 (2015) 2179–2187. https://doi.org/10.1557/jmr.2015.180.

[27] C. Likitaporn, P. Mora, S. Tiptipakorn, S. Rimdusit, Recovery stress enhancement in shape memory composites from silicon carbide whisker–filled benzoxazine-epoxy polymer alloy, J. Intell. Mater. Syst. Struct. 29 (2018) 388–396. https://doi.org/10.1177/1045389X17708041.

[28] R. Biju, C.P.R. Nair, Effect of phenol end functional switching segments on the shape memory properties of epoxy-cyanate ester system, J. Appl. Polym. Sci. 131 (2014) n/a-n/a. https://doi.org/10.1002/app.41196.

[29] K. Sunitha, K.S. Santhosh Kumar, D. Mathew, C.P. Reghunadhan Nair, Shape Memory Polymers (SMPs) derived from phenolic cross-linked epoxy resin via click chemistry, Mater. Lett. 99 (2013) 101–104. https://doi.org/10.1016/j.matlet.2013.02.080.

[30] Y. Liu, C. Han, H. Tan, X. Du, Thermal, mechanical and shape memory properties of shape memory epoxy resin, Mater. Sci. Eng. A. 527 (2010) 2510–2514. https://doi.org/10.1016/j.msea.2009.12.014.

[31] T. Tanpitaksit, C. Jubsilp, S. Rimdusit, Effects of benzoxazine resin on property enhancement of shape memory epoxy: A dual function of benzoxazine resin as a curing agent and a stable network segment, Express Polym. Lett. 9 (2015) 824–837. https://doi.org/10.3144/expresspolymlett.2015.77.

[32] A.B. Leonardi, L.A. Fasce, I.A. Zucchi, C.E. Hoppe, E.R. Soulé, C.J. Pérez, R.J.J. Williams, Shape memory epoxies based on networks with chemical and physical crosslinks, Eur. Polym. J. 47 (2011) 362–369. https://doi.org/10.1016/j.eurpolymj.2010.12.009.

[33] W.B. Song, L.Y. Wang, Z.D. Wang, Synthesis and thermomechanical research of shape memory epoxy systems, Mater. Sci. Eng. A. 529 (2011) 29–34. https://doi.org/10.1016/j.msea.2011.08.049.

[34] S. Grishchuk, L. Sorochynska, O.C. Vorster, J. Karger-Kocsis, Structure, thermal, and mechanical properties of DDM-hardened epoxy/benzoxazine hybrids: Effects of epoxy resin functionality and ETBN toughening, J. Appl. Polym. Sci. 127 (2013) 5082–5093. https://doi.org/10.1002/app.38123.

[35] Q. Zhao, W. Zou, Y. Luo, T. Xie, Shape memory polymer network with thermally distinct elasticity and plasticity, Sci. Adv. 2 (2016) 1–8. https://doi.org/10.1126/sciadv.1501297.

[36] F.I. Altuna, C.E. Hoppe, R.J.J. Williams, Shape memory epoxy vitrimers based on DGEBA crosslinked with dicarboxylic acids and their blends with citric acid, RSC Adv. 6 (2016) 88647–88655. https://doi.org/10.1039/c6ra18010h.

[37] Z. Ma, Y. Wang, J. Zhu, J. Yu, Z. Hu, Bio-based epoxy vitrimers: Reprocessibility, controllable shape memory, and degradability, J. Polym. Sci. Part A Polym. Chem. 55 (2017) 1790–1799. https://doi.org/10.1002/pola.28544.

[38] M. Fan, J. Liu, X. Li, J. Zhang, J. Cheng, Thermal, mechanical and shape memory properties of an intrinsically toughened epoxy/anhydride system, J. Polym. Res. 21 (2014). https://doi.org/10.1007/s10965-014-0376-9.

[39] M. Fan, X. Li, J. Zhang, J. Cheng, Curing kinetics and shape-memory behavior of an intrinsically toughened epoxy resin system, J. Therm. Anal. Calorim. 119 (2015) 537–546. https://doi.org/10.1007/s10973-014-4106-7.

[40] H. Guo, Y. Li, J. Zheng, J. Gan, L. Liang, K. Wu, M. Lu, Reinforcement in the mechanical properties of shape memory liquid crystalline epoxy composites, J. Appl. Polym. Sci. 132 (2015) 1–11. https://doi.org/10.1002/app.42616.

[41] H. Guo, Y. Li, J. Zheng, J. Gan, L. Liang, K. Wu, M. Lu, High thermo-responsive shape memory epoxies based on substituted biphenyl mesogenic with good water resistance, RSC Adv. 5 (2015) 67247–67257. https://doi.org/10.1039/c5ra10957d.

[42] M. Ariraman, R. Sasikumar, M. Alagar, Shape memory effect on the formation of oxazoline and triazine rings of BCC/DGEBA copolymer, RSC Adv. 5 (2015) 69720–69727. https://doi.org/10.1039/c5ra10373h.

[43] S. Grishchuk, Z. Mbhele, S. Schmitt, J. Karger-Kocsis, Structure, thermal and fracture mechanical properties of benzoxazine-modified amine-cured DGEBA epoxy resins, Express Polym. Lett. 5 (2011) 273–282. https://doi.org/10.3144/expresspolymlett.2011.27.

[44] L.M. Zhao, X. Feng, X.J. Mi, Y.F. Li, H.F. Xie, X.Q. Yin, Mechanical reinforcement and shape memory effect of graphite nanoplatelet-reinforced epoxy composites, J. Intell. Mater. Syst. Struct. 26 (2015) 1491–1497. https://doi.org/10.1177/1045389X14544142.

[45] J.R. Lin, L.W. Chen, Shape-Memorizzed Crosslinked Eser-Type Polyurethane and Its Mechanical Viscoelastic Model, J. Appl. Polym. Sci. 73 (1999) 1305–1319. https://doi.org/10.1002/(SICI)1097-4628(19990815)73:7<1305::AID-APP24>3.0.CO;2-5.

[46] C. Park, J.Y. Lee, B.C. Chun, Y.C. Chung, J.W. Cho, B.G. Cho, Shape memory effect of poly(ethylene terephthalate) and poly(ethylene glycol) copolymer cross-linked with glycerol and sulfoisophthalate group and its application to impact-absorbing composite material, J. Appl. Polym. Sci. 94 (2004) 308–316. https://doi.org/10.1002/app.20903.

[47] D.P. Nair, N.B. Cramer, T.F. Scott, C.N. Bowman, R. Shandas, Photopolymerized thiol-ene systems as shape memory polymers, Polymer (Guildf). 51 (2010) 4383–4389. https://doi.org/10.1016/j.polymer.2010.07.027.

[48] I.M. Barszczewska-Rybarek, A. Korytkowska-Wałach, M. Kurcok, G. Chladek, J. Kasperski, DMA analysis of the structure of crosslinked poly(methyl methacrylate)s, Acta Bioeng. Biomech. 19 (2017) 47–53. https://doi.org/10.5277/ABB-00590-2016-01.

[49] G. Liu, C. Guan, H. Xia, F. Guo, X. Ding, Y. Peng, Novel shape-memory polymer based on hydrogen bonding, Macromol. Rapid Commun. 27 (2006) 1100–1104. https://doi.org/10.1002/marc.200600189.

[50] F. Li, Y. Chen, W. Zhu, X. Zhang, M. Xu, Shape memory effect of polyethylene/nylon 6 graft copolymers, Polymer (Guildf). 39 (1998) 6929–6934. https://doi.org/10.1016/S0032-3861(98)00099-8.

[51] J. Xu, W. Shi, W. Pang, Synthesis and shape memory effects of Si-O-Si cross-linked hybrid polyurethanes, Polymer (Guildf). 47 (2006) 457–465. https://doi.org/10.1016/j.polymer.2005.11.035.

[52] C.M. Yakacki, R. Shandas, C. Lanning, B. Rech, A. Eckstein, K. Gall, Unconstrained recovery characterization of shape-memory polymer networks for cardiovascular applications, Biomaterials. 28 (2007) 2255–2263. https://doi.org/10.1016/j.biomaterials.2007.01.030.

[53] M.J. Jo, H. Choi, H. Jang, W.R. Yu, M. Park, Y. Kim, J.K. Park, J.H. Youk, Preparation of epoxy-based shape memory polymers for deployable space structures using diglycidyl ether of ethoxylated bisphenol-A, J. Polym. Res. 26 (2019). https://doi.org/10.1007/s10965-019-1801-x.

[54] M. Fan, H. Yu, X. Li, J. Cheng, J. Zhang, Thermomechanical and shape-memory properties of epoxy-based shape-memory polymer using diglycidyl ether of ethoxylated bisphenol-A, Smart Mater. Struct. 22 (2013). https://doi.org/10.1088/0964-1726/22/5/055034.

[55] T. Williams, M. Meador, S. Miller, D. Scheiman, Effect of graphene addition on shape memory behavior of epoxy resins, Int. SAMPE Tech. Conf. (2011).

[56] T. Tanpitaksit, M. Okhawilai, S. Rimdusit, Shape fixity and shape recovery characteristics of aliphatic epoxy-benzoxazine shape memory polymer, J. Met. Mater. Miner. 24(1) (2014) 43–47. https://doi.org/10.14456/jmmm.2014.8.

[57] A. Arnebold, A. Hartwig, Fast switchable, epoxy based shape-memory polymers with high strength and toughness, Polymer (Guildf). 83 (2016) 40–49. https://doi.org/10.1016/j.polymer.2015.12.007.

[58] M.K. Hassan, S.J. Tucker, A. Abukmail, J.S. Wiggins, K.A. Mauritz, Polymer chain dynamics in epoxy based composites as investigated by broadband dielectric spectroscopy, Arab. J. Chem. 9 (2016) 305–315. https://doi.org/10.1016/j.arabjc.2015.07.016.

[59] K. Hearon, M.A. Wierzbicki, L.D. Nash, T.L. Landsman, C. Laramy, A.T. Lonnecker, M.C. Gibbons, S. Ur, K.O. Cardinal, T.S. Wilson, K.L. Wooley, D.J. Maitland, A Processable Shape Memory Polymer System for Biomedical Applications, Adv. Healthc. Mater. 4 (2015) 1386–1398. https://doi.org/10.1002/adhm.201500156.

[60] Y.Y.C. Choong, M. Saeed, H. Eng, P.C. Su, J. Wei, Exploring variability in shape memory properties of stereolithography printed parts, in: Solid Free. Fabr. 2016 Proc. 27th Annu. Int. Solid Free. Fabr. Symp. - An Addit. Manuf. Conf. SFF 2016, 2016: pp. 1807–1814.