

REPORT OF ANALYSIS - PHYSICS, PARTICLE & SURFACE ANALYSIS

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|----------------------|----------------------------------------------|
| Sample: | TB1180B |
| Order title/Product: | Graphene / Raman microscopy |
| Project: | Graphene |
| Account: | Curia Germany GmbH |
| Customer: | Dr. Thorsten Busch |
| Order no.: | 25-050404-2 |
| Remarks: | Raman measurement on request of the customer |

Method:

Raman spectroscopy/microscopy using Senterra I Raman microscope (Bruker).

Procedure:

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|-----------------------|--------------------|
| Objective: | Raman spectroscopy |
| Field of Application: | Powder |

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| Principle: | The substance is applied to a quartz microscope slide and examined under the microscope. The objective is selected and focused to examine an exact location using Raman. At this position, several points are examined with the laser and a corresponding number of Raman spectra are recorded. |
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| Reference: | N/A |
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Experimental Details and Result

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| Equipment: | Senterra I Raman microscope (Bruker) |
| Magnification: | 20 x |
| Wavenumber range: | 45 – 3700 cm ⁻¹ |
| Wavenumber step size | 3 – 5 cm ⁻¹ |
| Co-addition: | 100 |
| Exposure time: | 10000 ms |
| Evaluation: | Averaging over similar spectra |

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Result:

| Absorption band | 2D band | G band | D band | D/G ratio |
|----------------------------|-------------|-------------|------------|-----------|
| Integration range | 2791 - 2557 | 1753 – 1474 | 1474 – 959 | |
| Integral _{Typ A} | 9,690 | 226,6 | 322,3 | 1,422 |
| Peak high _{Typ J} | 0,123 | 1,895 | 1,708 | 0,901 |

Spectra see attachment.

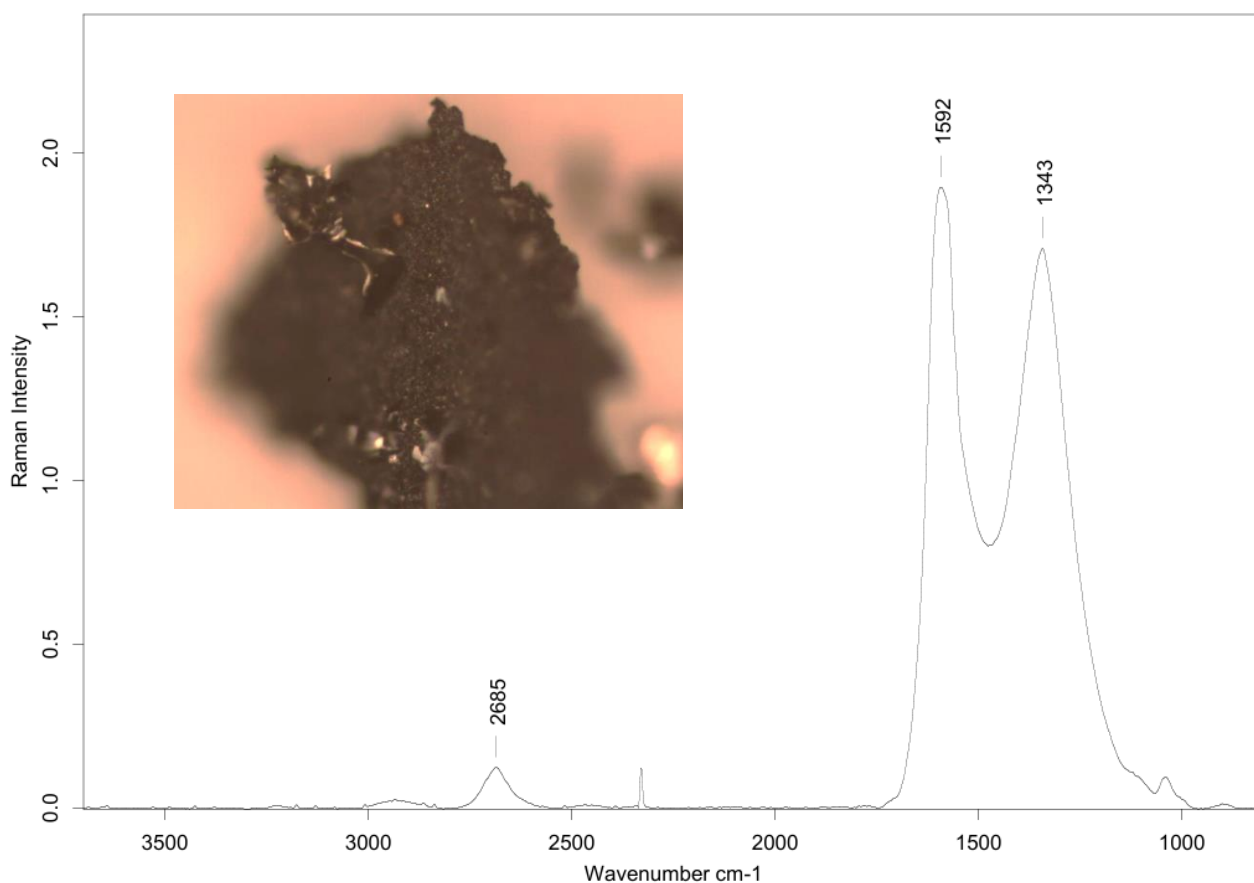


Figure 1: TB1180B, average spectrum over 8 recordings

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