Term Paper Subjects: EMAC 270, spring 2024

You must choose the subject for your term paper from the topics listed below. No other subjects are allowed. A special software will be used to check the degree of cut-and-paste. Any portion that contains more than 50 consecutive word match is considered violation of copyright law.

1. Reversible reactions through dynamic bonds, such as Diels-Alder reactions, aza-Diels-Alder reactions, isocyanate/OH reactions, transesterification, and vitrimers, for potential recycling or upcycling applications of thermosetting polymers.
2. Natural renewable materials as green, flame retardant additives or raw materials for intrinsically noncombustible polymer synthesis.
3. Composites made of whiskers and nanofibers (no ordinary fibers: Diameters less than several hundred nm) from biological origins (cellulose, chitin, chitosan, keratin, and others).
4. Application of MXene in polymer composites for improved strength, electromagnetic interference, thermal conductivity, and flame retardation.
5. Molecular understanding of glass transition processes with emphasis of modern theories.
6. Microporous/nanoporous polymers and carbons therefrom.
   A. High surface area polymers for adsorption of rare metals and other metallic resources, such as uranium, as means of collecting natural resources otherwise not possible.
   B. High surface area polymers for adsorption of environmentally polluting gases, such as CO_2, NO_x
7. Truly biodegradable PHA (polyhydroxyalkanoates).
8. Polymers for extreme high temperature applications (degradation temperature above 500^{o}C) for potential application of hypersonic traveling.
9. Non-metallic carbon catalysts derived from polymeric precursors or purely organic polymer catalysts.
10. Fundamental understanding of hydrogen bonding in monomers and polymers and its application in supramolecular synthesis.
11. Recovery of monomers from polymer waste via chemical digestion for upcycling.