

Design Polymer Matrix for Manufacturing Recyclable Composites with High Thermal Conductivity

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As next-generation miniaturized electronics are being developed with higher power density, a need for effectively dissipating the generated heat during the device operation is becoming ever greater. As a solution for both efficient heat dissipation and lighter weight device development, packaging/conformal coating the electronics with thermally conductive materials with lighter weight has been suggested. Thermosetting polymers have been widely adapted as matrix incorporating relatively heavy but functional fillers to produce more practically useful materials with lighter weights in composite industries. However, lack of melt-processability of thermosets greatly limits their recycling since the simplest and most economical way to recycle plastics with the lowest carbon footprint is re-paring or re-melting into new items. In this talk, to those ends, a new networked but still melt-processable polymer will be introduced, which could yield the recyclable polymer composites with high thermal conductivity. To further highlight the versatility of the matrix, the incorporated filler was recovered from the composite by depolymerizing the matrix, thus the filler is readily reusable for the future.