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Graphene Thermoplastic and Thermoset Materials: An Update on Recent Progress

There is a surging demand for lighter and stronger materials in the polymer industry and extensive R&D has been done to significantly improve the properties of many polymers by the addition of graphene. Graphene nanoplatelets thoroughly dispersed in various polymer matrices represent the first commercially viable use of graphene. In this presentation, we focus on our recent developments in high performance graphene composites based on both thermoplastic and thermoset resins. One of our first graphene products is PLA-based conductive filament with volume resistivity as low as $0.6 \Omega \cdot \text{cm}$. This material is compatible with most of the commercial FDM printers, and apt for creating conductive traces and sensors. In addition, we have created a line of graphene composites and master batches that can then be “let down” or diluted for further processing into parts by extrusion or injection molding.

Another significant breakthrough in functional graphene materials is the launch of several graphene-enhanced conductive adhesives distributed under trademark G6-EPOXY™ (visit www.g6-epoxy.com for full list of specifications). We have developed metal-free carbon-based epoxy with volume resistivity below $5 \Omega \cdot \text{cm}$, making it one of the best metal-free conductive adhesives currently available in the market. We have also developed hybrid epoxies (highly electrically conductive adhesives) with a proprietary formulated blend of graphene, silver fillers and other additives. With the development of this proprietary formulation, we have not only ensured the electrical conductivity of these epoxies to be at par with the existing commercial products but have also successfully managed to substantially reduce the percentage of silver content in the epoxies improving the mechanical properties and ease of processing.