Up-scaling of high conductivity graphene nanoplatelets and its integration in thermal interface materials

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Abstract

As a result of participating in the H2020 INSPIRED Project, Thomas Swan has developed a novel scalable method for exfoliating graphite in liquids to give large-volume dispersions of graphene nanoplatelets. The product is a pristine, high conductivity graphene nanoplatelet material which is available in both powder format and as a surfactant stabilised aqueous dispersion (Elicarb® Graphene).

Several graphene dispersions have been studied in terms of stability by zeta potential measurements. The Results are consistent with a relatively stable dispersion when unwashed (zeta potential magnitude > 30 mV). Their rheological behaviour is shown on figure 2.

Structural characterization of Elicarb® graphene by SEM is shown in figure 1. Ratio of Raman D/G peaks (measure of graphene quality): D/G < 0.5. The ratio is consistent with small, defect free flakes. Number of layers < 10 for "Premium Grades"

Thermal Conductivity of graphene nanocomposites (TIMs): at 7% loading in a resin, the GNPs typically double the thermal conductivity and are easily dispersed.

References


Figures

Figure 1: Elicarb® Premium Grade
Typically ca.1 μm D/G 0.2-0.3
Sheet resistance <10 Ω/□

Figure 2: Rheologic profile of different composition Elicarb graphene dispersion

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