Dual-functional graphene infused polymer composites

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We report a detailed study of an ecological and dual-functional polymer composite for electromagnetic interference (EMI) shielding and heat management applications. We studied a series of polylactic acid/graphene nanoplatelets composites with six graphene nanoplatelets loadings and three different flake lateral sizes. The multifunctionality of the composites is realised via high EMI shielding – up to 42 dB per 1 mm thick sample, and thermal conductivity of 1.72 W/mK at 15 wt% nanofiller loading. The EMI shielding measurements were conducted in the microwave range consisting of the highly relevant X-band (8-12 GHz). Additionally we investigate the influence of the nanofiller lateral size on the studied physical properties to optimize the studied functionalities per given nanofiller loading. In the age of mobile electronics and increased aerospace interest, multifunctional materials like the polymer composites reported here, are interesting alternatives to conventional materials, offering reduced cost and size of e.g. an electrical device packaging.



Figure 1 (a) Picture of pure PLA polymer and PLA/GNP composite; (b&c) SEM images showing a crossection of a PLA/GNP composite and a closeup of a single GNP; (d) shielding efficiency of PLA/GNP composites in function of GNP loading and conductivity.