Supplementary Information

Rolle of electrochemically functionalized graphene nano-fillers on the structural performance of epoxy based composite.

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Electrochemical synthesis of f-GNSs

The electrolytic cell configuration consists of a high-quality pyrolytic graphite sheet of exposing volume of 0.45 cm$^3$ as working electrode (WE) separated by 1 cm to the graphite counter electrode. Initially, a high negative DC bias of 10 V for 30 s followed by 3 V for 15 min was applied to the WE to serve a dual purpose, i.e., to make the availability of surface as well as internal lattice pores of graphite electrode for efficient intercalation. Then the cathodic treated WE have been swapped to the anodic terminal for the anionic intercalation and subsequent exfoliation with ramping applied bias from 0-8 V. Aftermath, the intercalation and exfoliation at a constant voltage of 8 V was carried out till the synthesis of the desired amount of exfoliated graphene nanosheets has been obtained. The obtained mixture of multilayer graphene-graphite sheets has been further disintegrated by probe sonication at 30 kHz for about 3 h. The obtained colloidal was centrifuged at 6000 rpm for 45 min, and supernatant f-GNSs is hence collected.

![Fig. S1: Electrochemical exfoliation technique.](image)
Fig. S2: FESEM of exfoliated graphene sheets.

Fig. S3: (a) GEG polymer composite fabricated sheet and (b) sliced sample for 3-point bend test as per ASTM D7264 standard.
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