

‘Template-free’ synthesis of self-assembled micro-spikes resulting in ‘sea-urchin’ like carbon structures suppress electromagnetic radiation

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Supplementary information

1. Bulk electrical conductivity of epoxy and epoxy/carbon nanotube (CNT) composites

Figure S1 shows the AC electrical conductivity of epoxy composites with 0.5 wt% CNT and 1 wt% CNT. For comparison with the epoxy/urchin-based composites, these control samples were prepared. From the plot, we observe that the dc electrical conductivity of composites with 0.5 wt% CNT and 1 wt% CNT is less compared to that of composites with C-urchins. This is mainly due to the poor dispersion of CNTs, hindering the connectivity in case of CNT-based epoxy composites. Also compared to C-urchins, high loading of CNTs remain challenge in the case of epoxy/CNT composites because of the sudden increase in the viscosity leading to the processing difficulties.

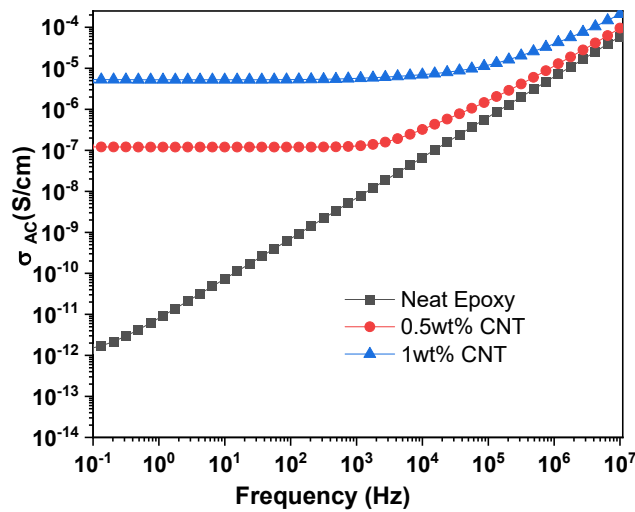


Figure S1: AC electrical conductivity of neat epoxy and epoxy/CNT composites

2. EMI shielding effectiveness (SE_T) of composites with 0.5 wt% CNT and 1 wt% CNT

Figure S2 shows the SE_T of epoxy composites with 0.5 wt% CNT and 1 wt% CNT (for 1 mm thickness, K band). For comparison with the epoxy/urchin-based composites, these control samples were prepared. From the plot, it can be observed that the SE_T of composite with 0.5 wt% CNT and 1 wt% CNT are -9 dB and -12 dB, respectively. In contrast, the epoxy composite containing urchins (7wt%) result in enhanced electromagnetic shielding performance. As already mentioned, increasing the content of CNT (above 1 wt%) in epoxy is a challenge. Also, the poor dispersion of CNTs in epoxy results in a lower SE_T value than urchin/epoxy composites.

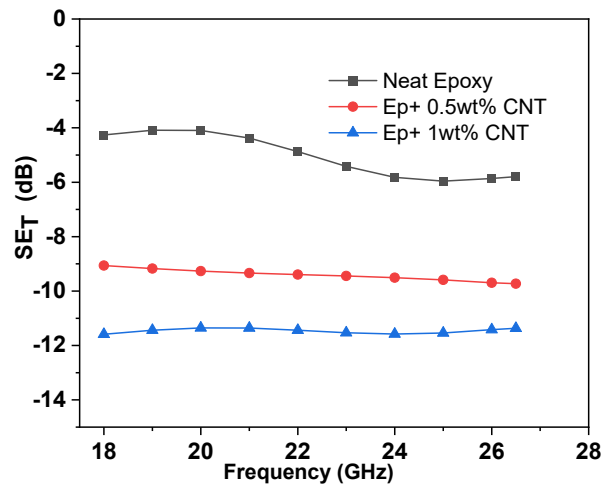


Figure S2 : SE_T vs. frequency plot of neat epoxy and epoxy/CNT composites