Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Construction of Carbonfiber based Layer-by-layer (LbL) assembly – a smart approach towards effective EMI shielding

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The figure S1 depicts the construction of multilayer nanocomposite where A represents MWNT and Fe-Mn ferrite incorporated PVDF film and B represents Nickle deposited carbon fibre coated with PVDF. Stacking up A and B in a repetitive manner and compression moulding it at 155°C gives rise to multilayer polymer composite. The thickness of the composite film is 0.60 mm.

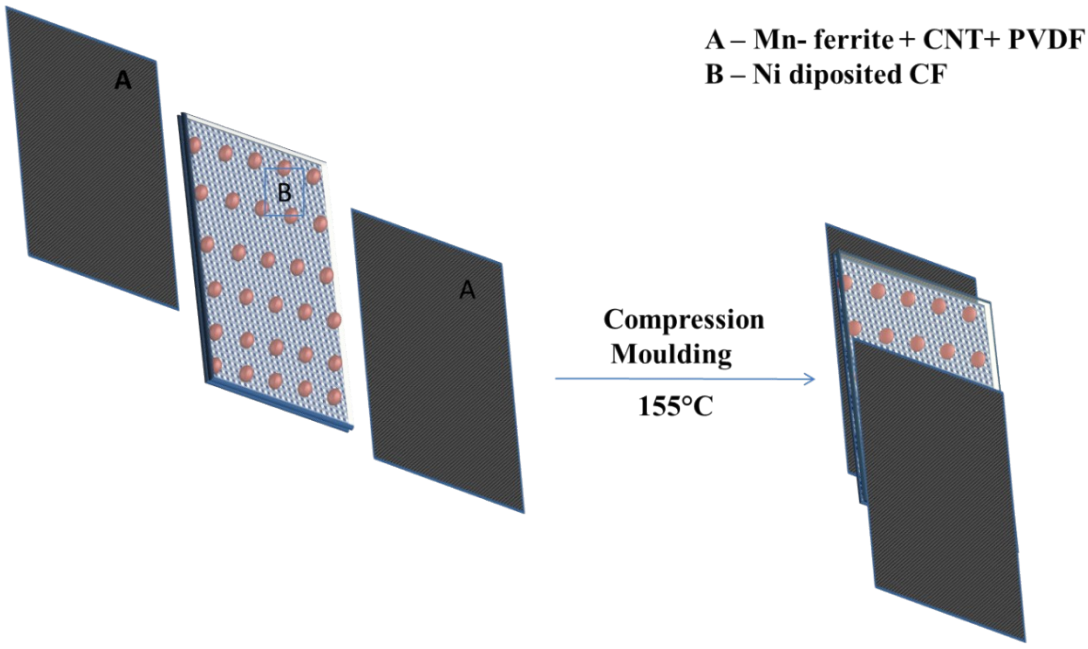

Figure S1: LbL Construction procedure

Figure S2 depicts the SEM micrograph of Mn ferrite system while arrows indicating Mn-ferrite system (blue) and MWNTs (brown).

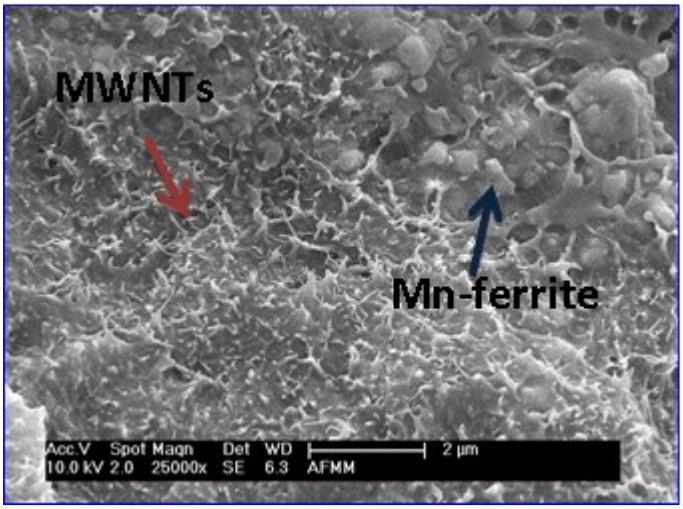

Figure S2: SEM micrograph of PVDF with MWNT and Mn ferrite system

AC electrical conductivity

Inter connected network of conducting nanoparticles, is the prime requisite for charge transportation through an insulting polymer composites. In addition of MWNTs the AC electrical conductivity is increased dramatically in the PNT composites while neat PVDF shows insulating in nature. But after addition of Mn-Fe nanoparticles, the overall AC electrical conductivity is decreased due to obstruction in interconnected conducting network. On the other hand CF mat is intrinsically conducting in nature and the electro less deposition of Ni particles is not impede the conducting network very much.

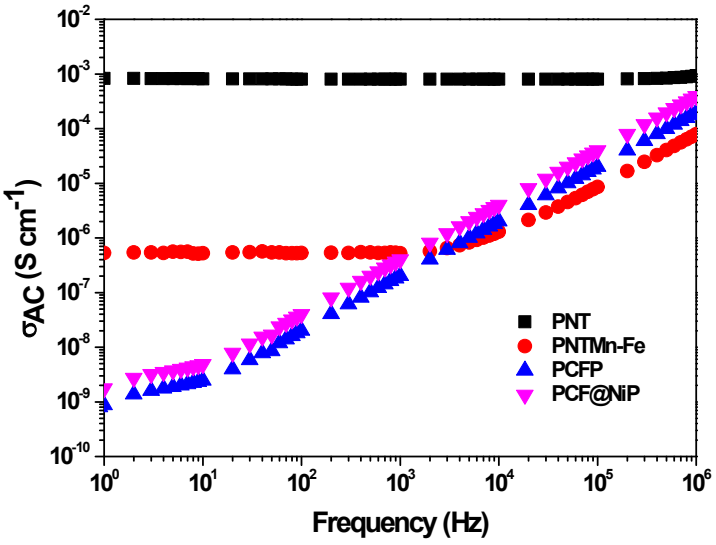

Figure S3: AC electrical conductivity of various prepared composites

Figure S4 depicts the mechanism of alternate LbL assembly. Where we construct LbL by putting PCF@NiP at top and bottom layers and PNTMn-Fe being the middle layer. As a consequence in this framework we are getting more reflection of incident EM wave as compared to other LbL assembly Figure 3(e).

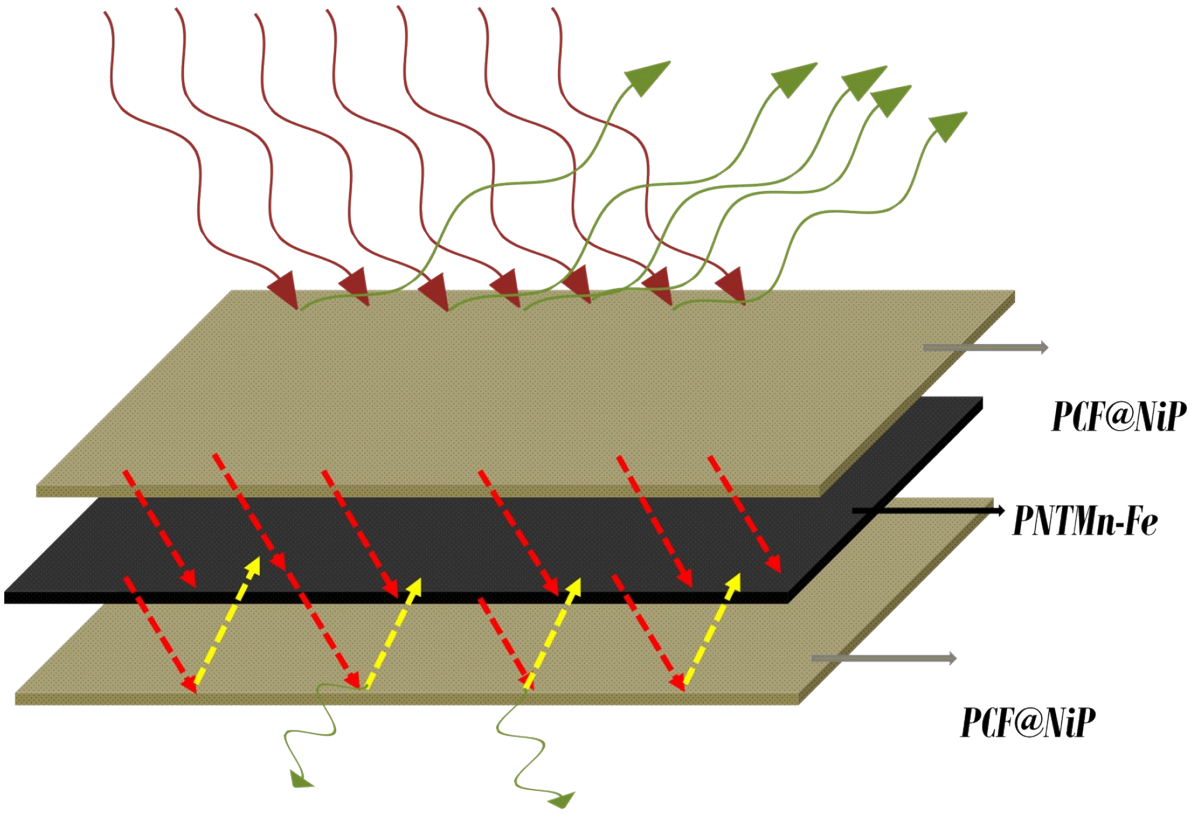

Figure S4: Schematic representation of shielding mechanism of LbL assembly

Table S1 depicts the shielding effectiveness of various nanocomposites studied here.

Table S1: SE_T at 18 GHz for various composites

Sample composition	Thickness	SE_T
PNTMn-Fe	0.1	18
PNTMn-Fe	0.2	25
PCF@NiP	0.4	30
PNTMn-Fe/PCF@NiP/PNTMn-Fe	0.6	52
PCF@NiP/ PNTMn-Fe/ PCF@NiP	0.6	48