Supporting Information

Facile preparation of large-scale expanded graphite/polydimethylsiloxane composites for Highly-efficient electromagnetic interference shielding

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Table S1. The density of the HOGF (initial density 67.6 mg cm^{-3}) after different compressive strains.

Compressive strain	The thickness under compressive load	The thickness after load removal	The density after load removal
0%	20.6 mm	/	67.6 mg cm^{-3}
10%	18.5 mm	19.3 mm	72.2 mg cm^{-3}

20%	16.5 mm	18.1 mm	76.9 mg cm^{-3}
30%	14.4 mm	16.3 mm	85.4 mg cm^{-3}
40%	12.4 mm	14.1 mm	98.8 mg cm^{-3}
50%	10.3 mm	11.5 mm	121.1 mg cm^{-3}
60%	8.2 mm	9.8 mm	142.1 mg cm^{-3}
70%	6.2 mm	7.9 mm	176.3 mg cm^{-3}
80%	4.1 mm	5.6 mm	248.7 mg cm^{-3}
90%	2.1 mm	3.4 mm	409.6 mg cm^{-3}

Table S2. The parameters of the HOGF/PDMS composites with different HOGF contents.

Samples	**Density of HOGF (mg cm^{-3})**	**Density of composite (mg cm^{-3})**	**Mass fraction (wt%)**
HOGF/PDMS-1	65.3	997.1	6.55
HOGF/PDMS-2	95.3	991.3	9.61
HOGF/PDMS-3	148.1	982.8	15.07
HOGF/PDMS-4	207.6	967.4	21.46

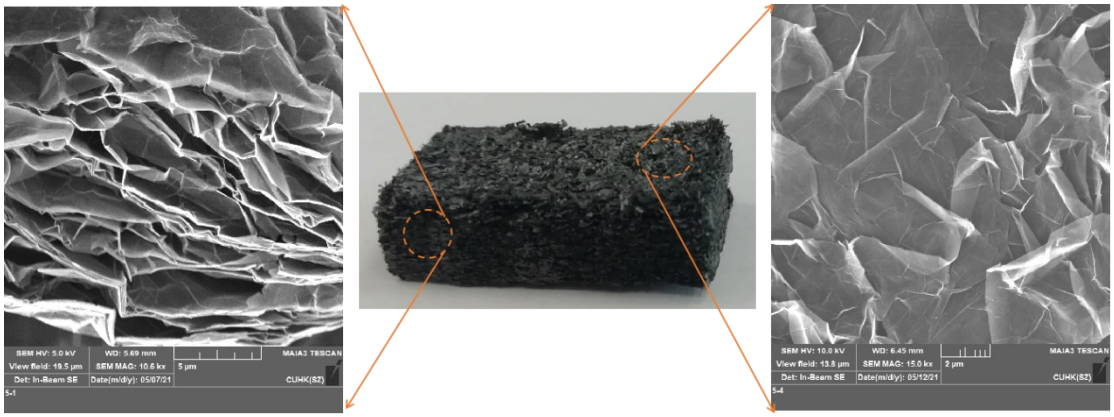

Fig. S1. The cross-sectional and top view scanning electron microscopy (SEM) images of HOGF.

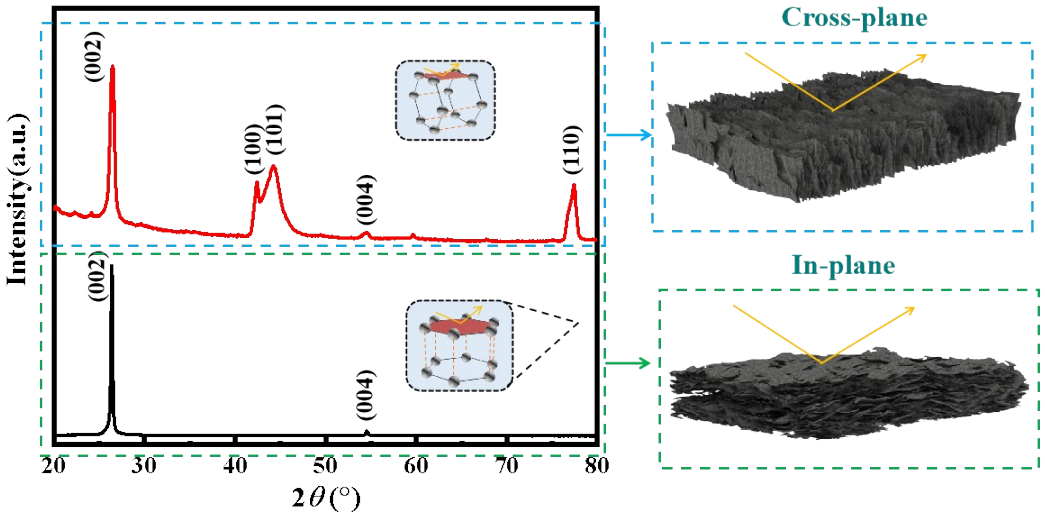

Fig. S2. Comparison the XRD profiles of HOGF in cross-plane and in-plane.

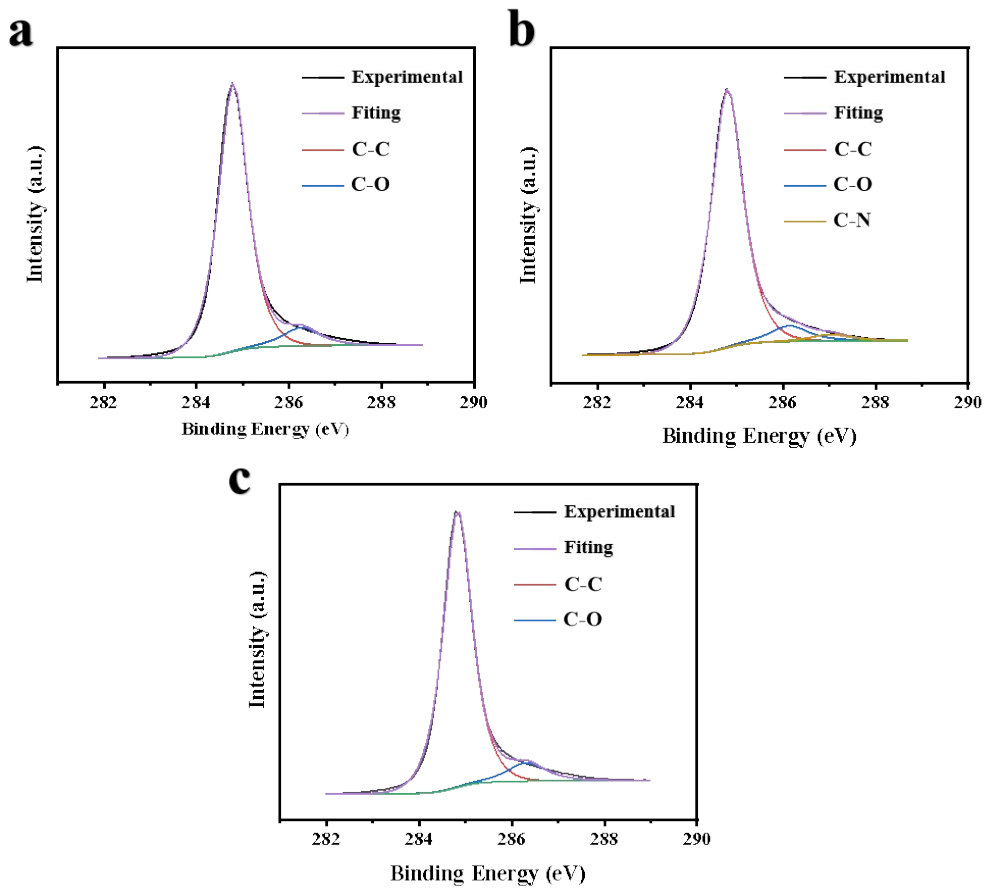

Fig. S3. Curve fitting of the C1 s spectra of the HOGF, PDMS and HOGF/PDMS composites.

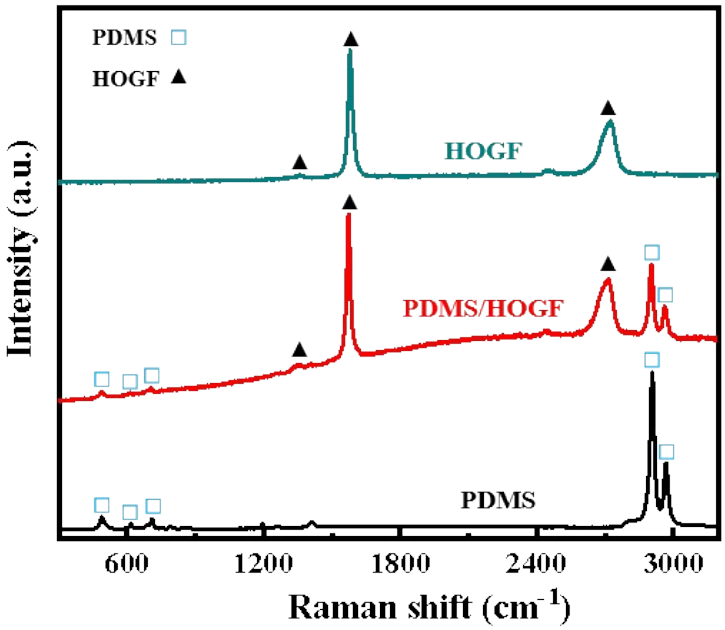

Fig. S4. Comparison of the Raman spectra of the PDMS, HOGF and HOGF/PDMS composites.

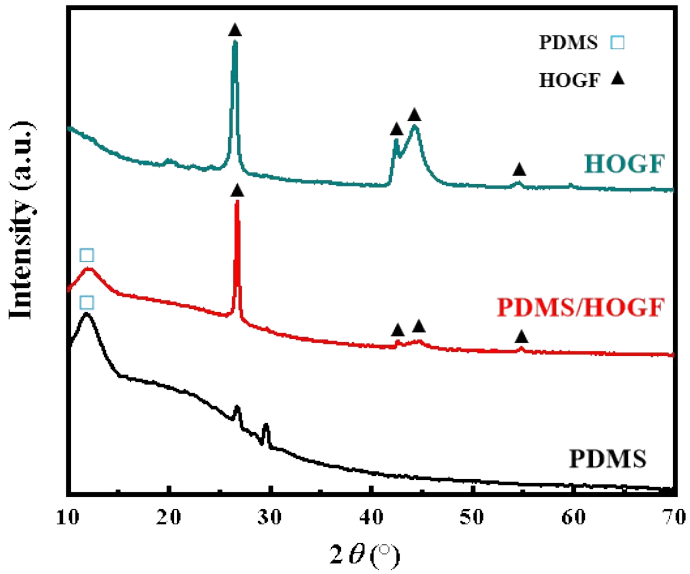

Fig. S5. Comparison of the XRD spectra of the PDMS, HOGF and HOGF/PDMS composites.

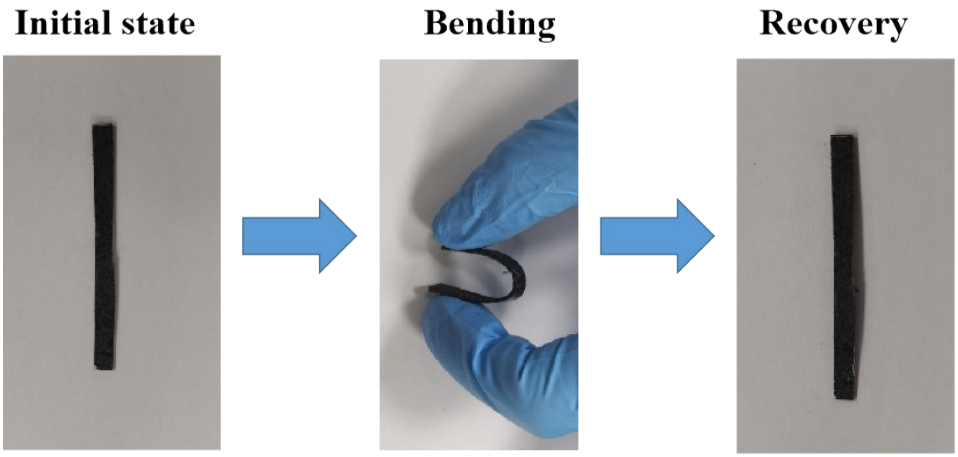

Fig. S6. The flexibility of the HOGF/PDMS composites under bending.

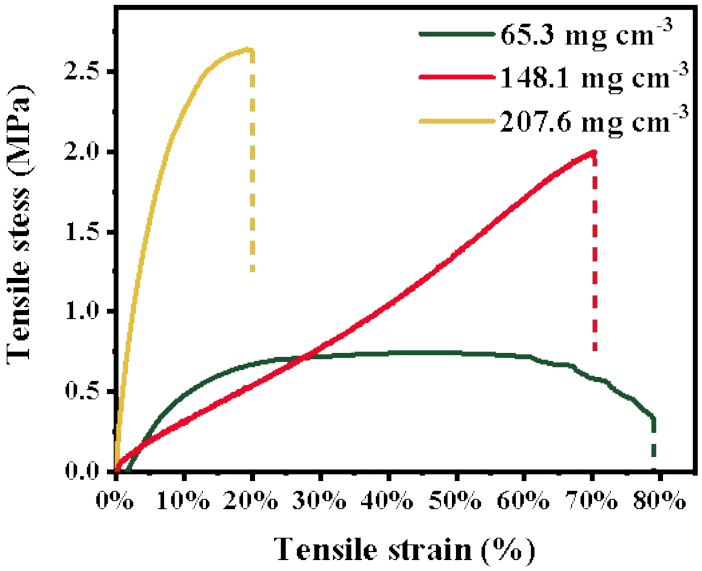

Fig. S7 The tensile stress-strain curves of the HAGF/PDMS composites.

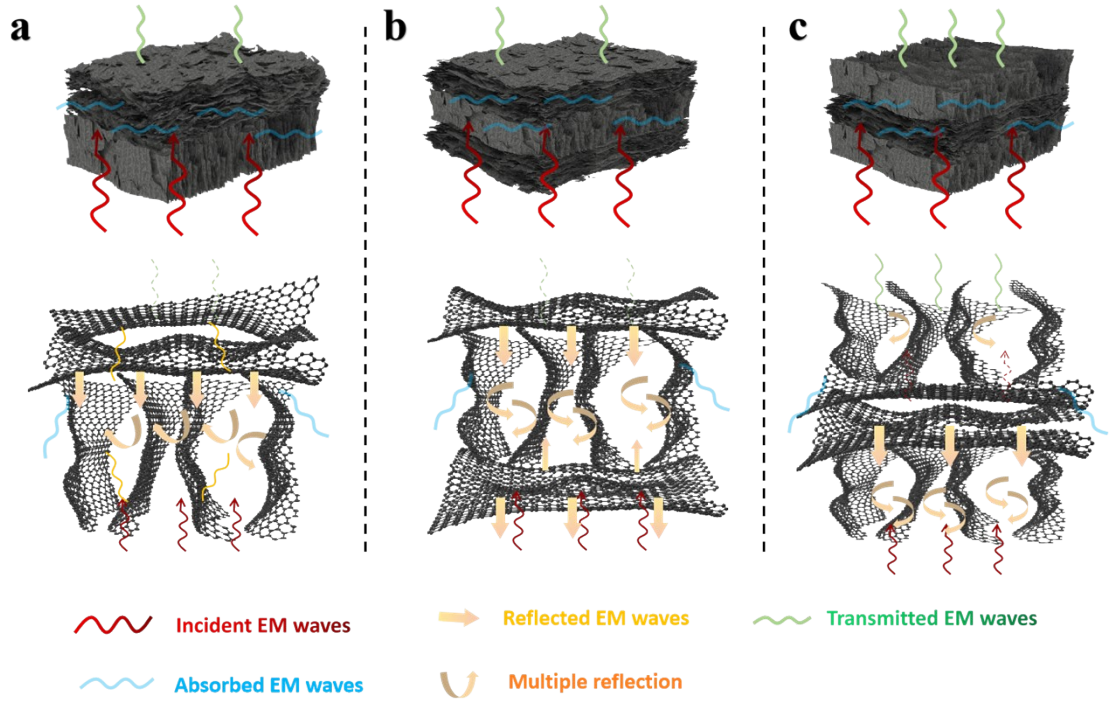

Fig. S8 Schematic diagram of EMI shielding mechanism analysis of HOGF/PDMS with different combined structures: (a) P-V; (b) P-V-P; (c) V-P-V.

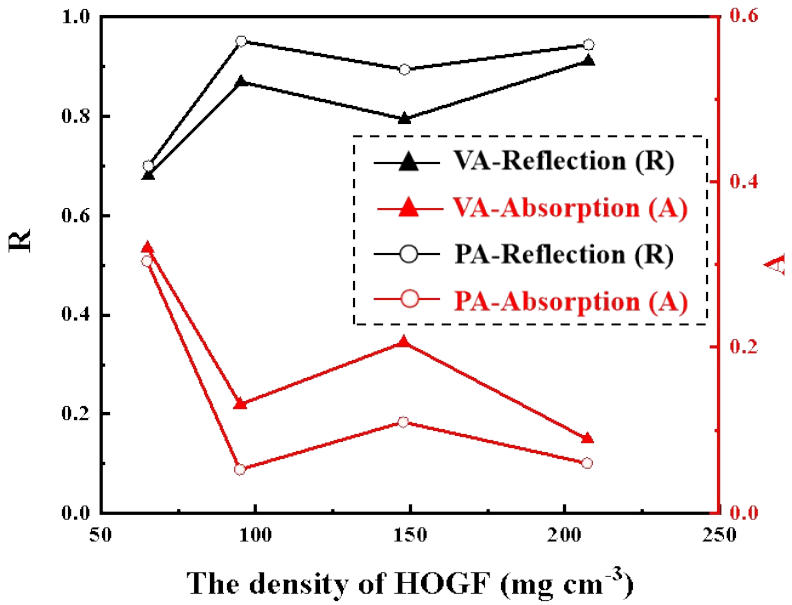

Fig. S9 Average reflection (R) and absorption (A) of the HOGF/PDMS composites with different HOGF density networks (same thickness 5 mm).

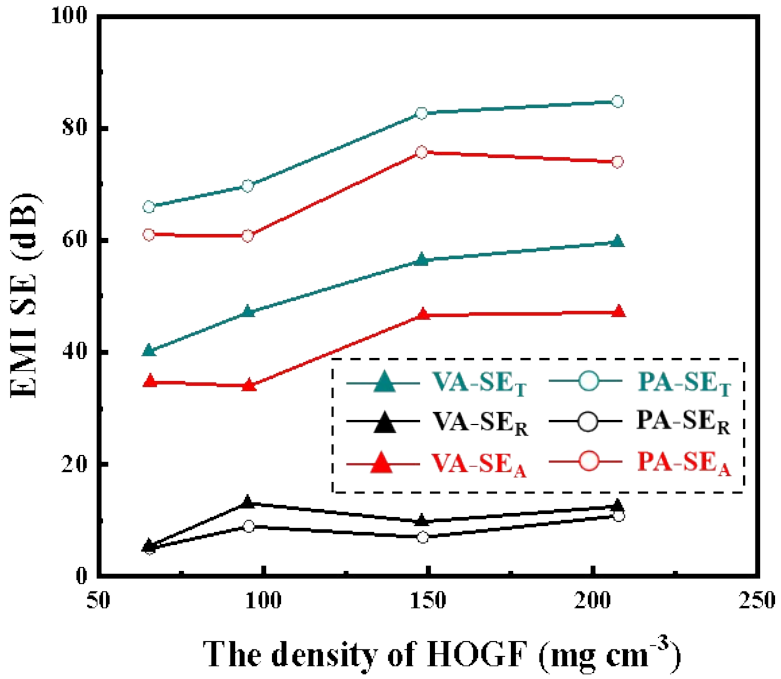

Fig. S10 Average SE_T, SE_R and SE_A of the HOGF/PDMS composites with different HOGF density networks (same thickness 5 mm).