

Flexible PVDF/carbon materials/Ni composite films maintaining strong electromagnetic wave shielding under cyclic microwave irradiation

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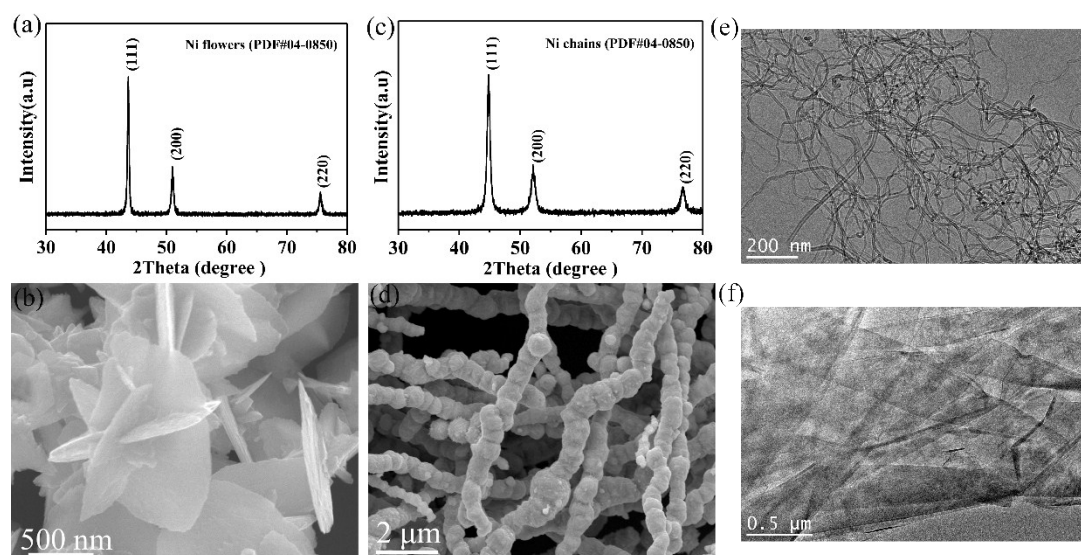


Figure S1. (a) XRD pattern and (b) SEM image of Ni flowers; (c) XRD pattern and (d) SEM image of Ni chains; TEM images of (e) MWCNTs and (f) GnPs.

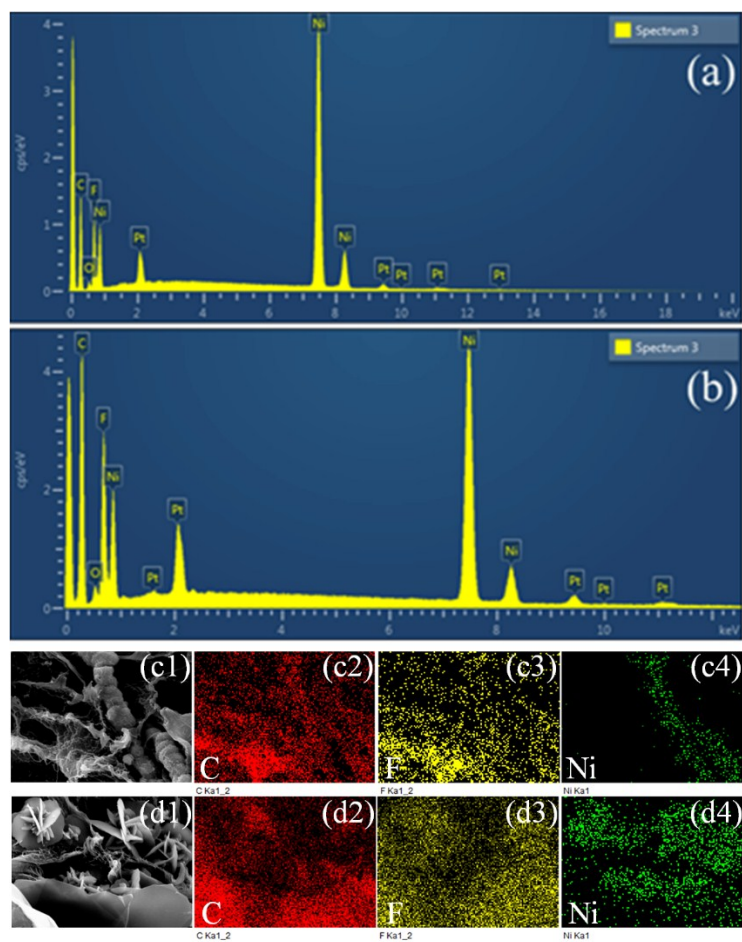


Figure S2. EDS patterns of (a) Ni-C-8 and (b) Ni-F-8 samples; (c1-c4) SEM image and elemental mapping (Ni, C and F) of Ni-C-8 sample; (d1-d4) SEM image and elemental mapping (Ni, C and F) of Ni-F-8 sample.

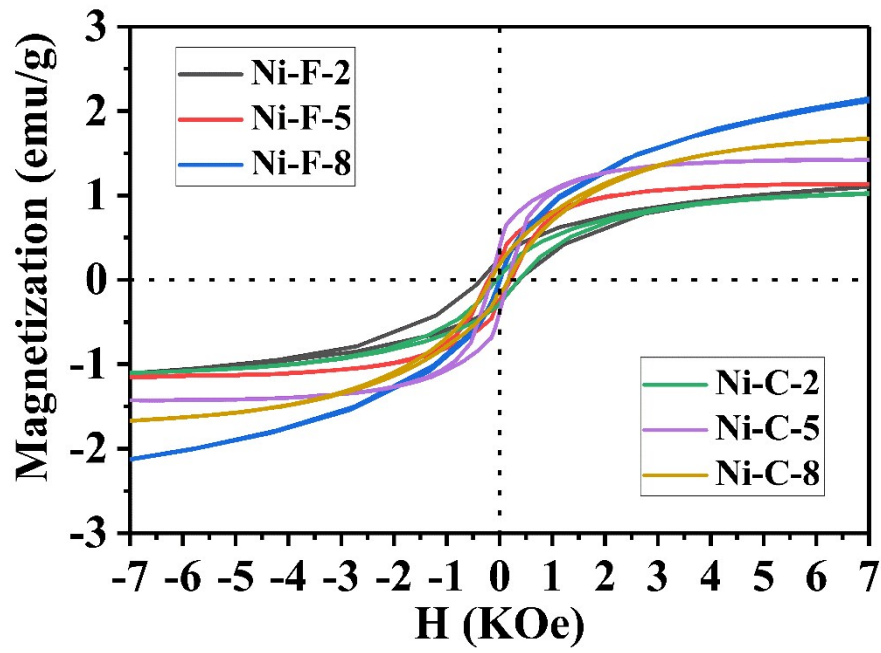


Figure S3. Magnetic hysteresis loops of PVDF/MWCNT/GnPs/Ni composite films.

Table S1. The M_s value of PVDF/MWCNT/GnPs/Ni composite films.

Sample	Ni-F-2	Ni-F-5	Ni-F-8	Ni-C-2	Ni-C-5	Ni-C-8
M_s value	1.13	1.19	2.15	1.03	1.42	1.68

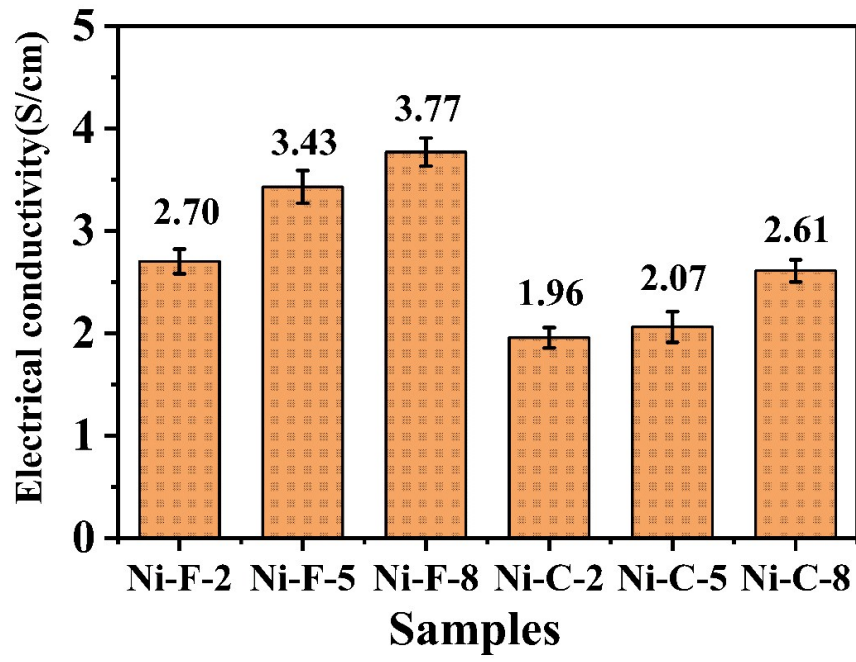


Figure S4. Electrical conductivity of PVDF/MWCNT/GnPs/Ni composite films.

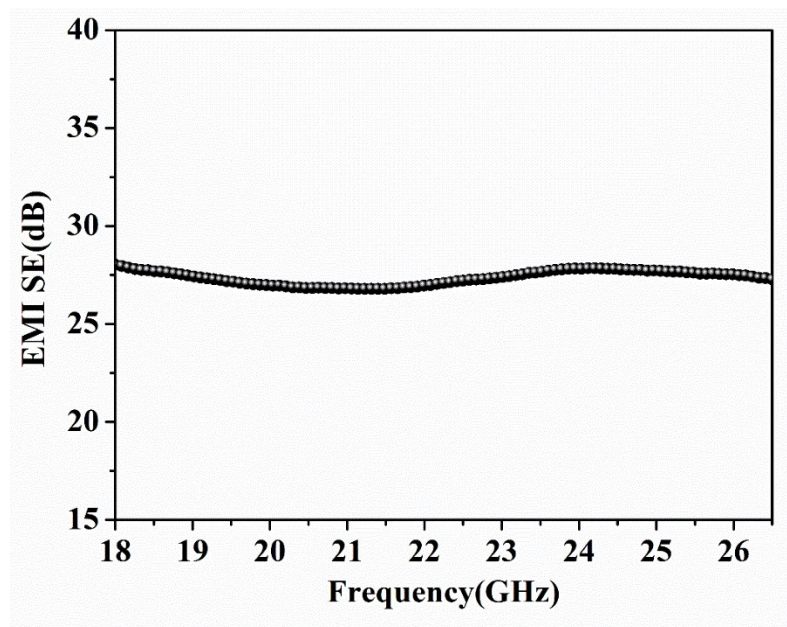


Figure S5. EMI shielding effectiveness of PVDF/3wt%MWCNT/6wt%GnPs composite film.

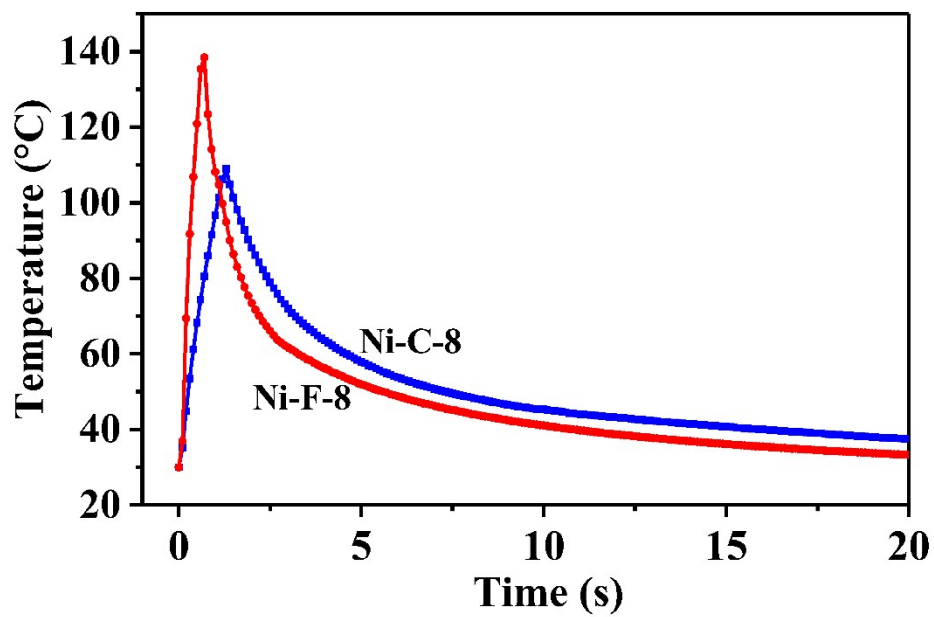


Figure S6. Temperature–time curves of the Ni-F-8 and Ni-C-8 flexible films during one time cyclic microwave irradiation

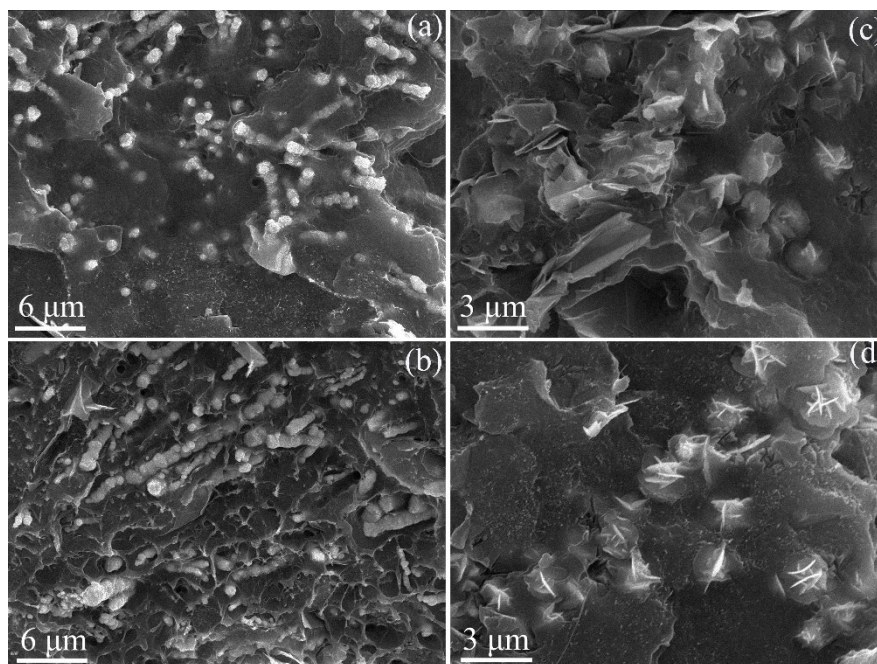


Figure S7. SEM images of (a) Ni-C-8(5), (b) Ni-C-8(20), (c) Ni-F-8(5) and (d) Ni-F-8(20) composite films;

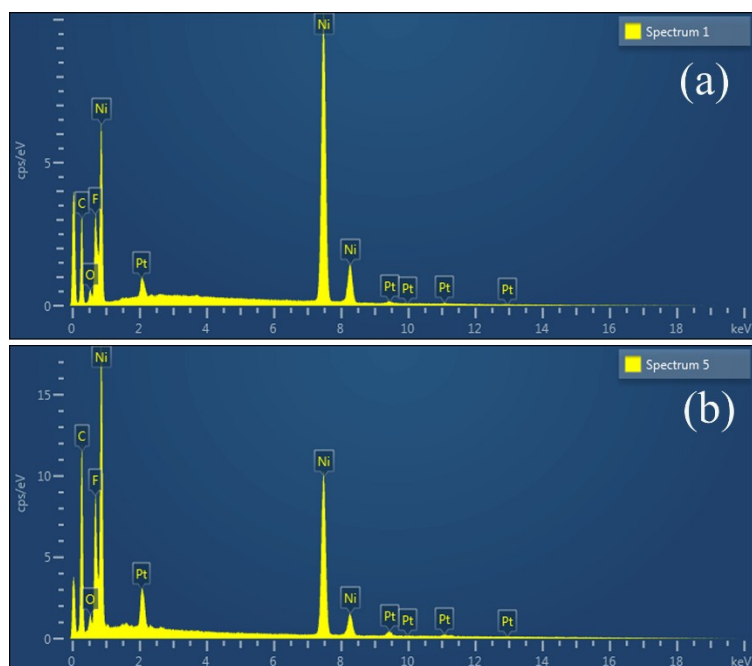


Figure S8. EDS patterns of (a) Ni-C-8(20) and Ni-F-8(20) samples

Table S2. The atomic ratio between Ni/O for the Ni-C-8, Ni-C-8(20), Ni-F-8 and Ni-F-8(20) samples

Samples	Ni-C-8	Ni-C-8(20)	Ni-F-8	Ni-F-8(20)
Ni/O ratio	20.1:2.3	21.2:3.2	10.3:2.3	9.0:3.3

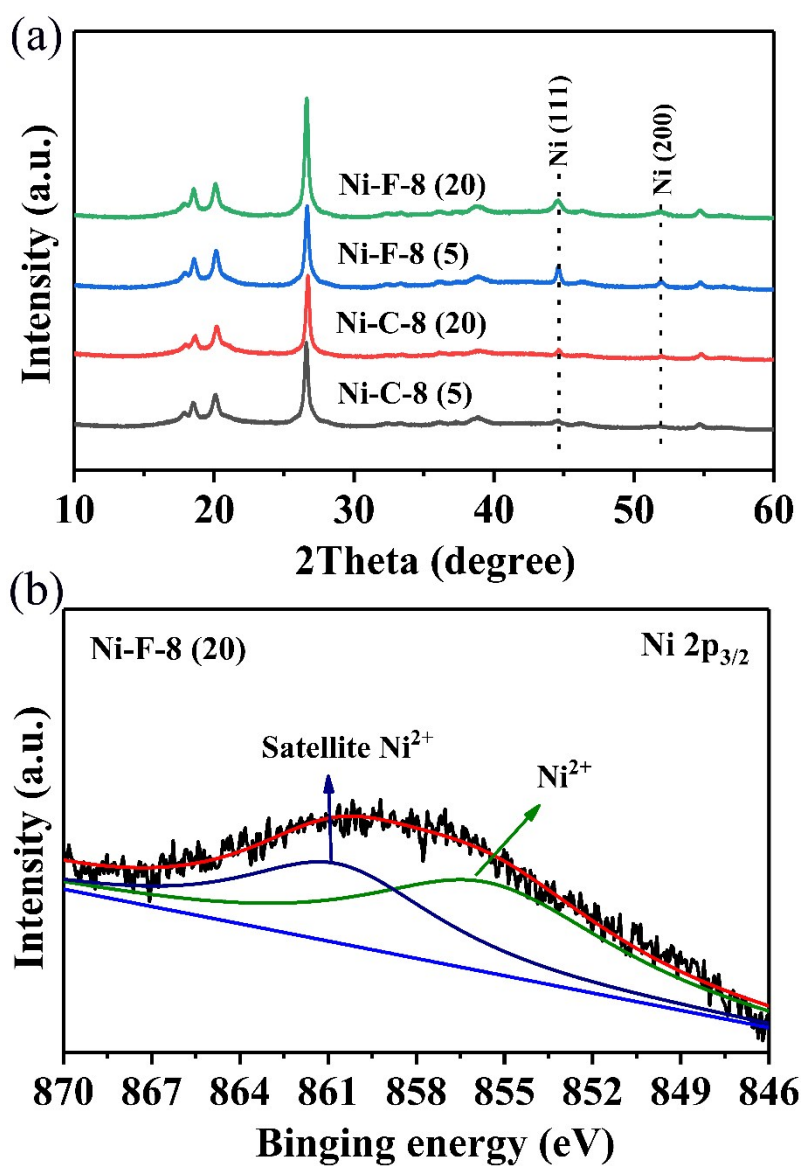


Figure S9. (a) XRD patterns of Ni-F-8 and Ni-C-8 films after 5 times and 20 times microwave irradiation; (b) XPS spectrum of Ni 2p_{3/2} for Ni-F-8(20) flexible film.