

Supporting Information for

## Self-Assembly MXene-rGO/CoNi Film with Massive Continuous Heterointerfaces and Enhanced Magnetic Coupling for Superior Microwave Absorber

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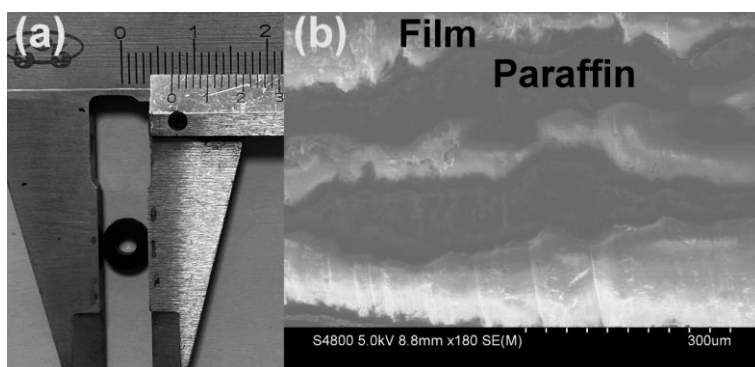
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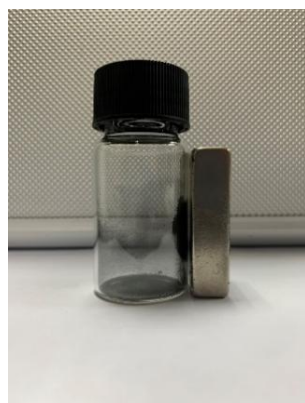
<sup>#</sup>Xiao Li and Zhengchen Wu contributed equally to this work

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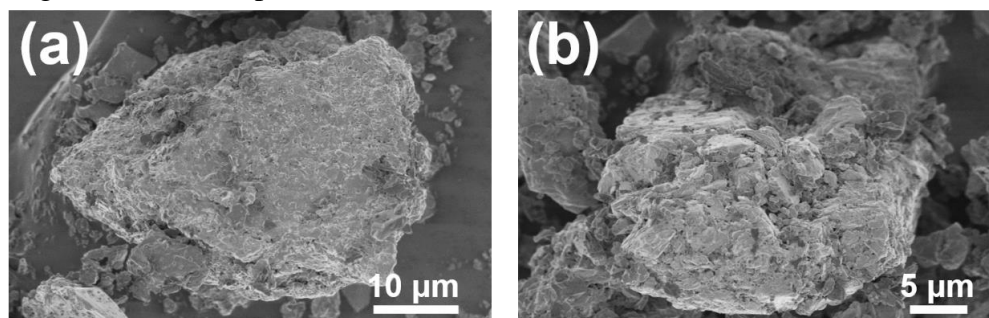
### Supplementary Figures



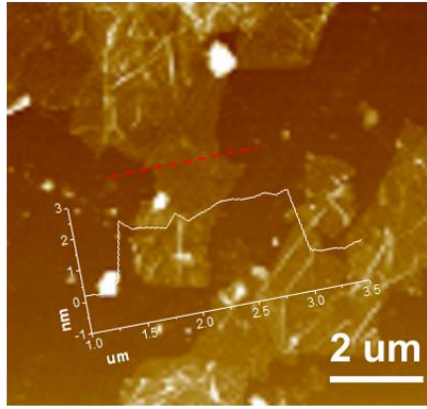
**Fig. S1** (a) The digital photo and (b) cross-section SEM image of ring sample for the measurement of EM parameters



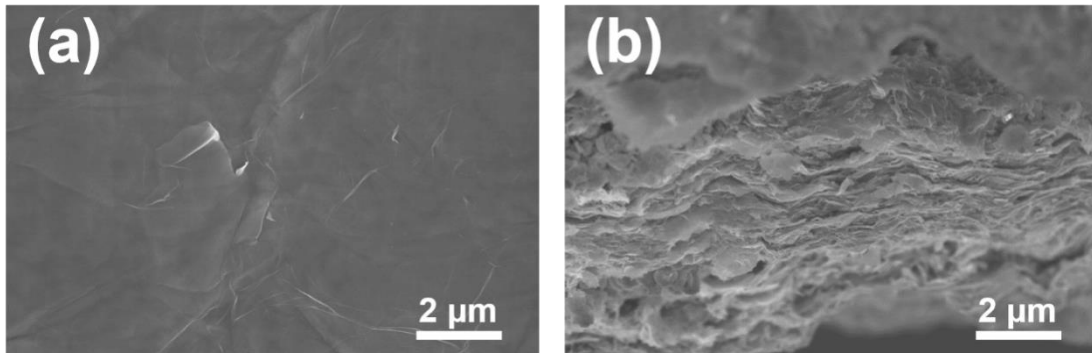
**Fig. S2** Image of rGO/CoNi powder



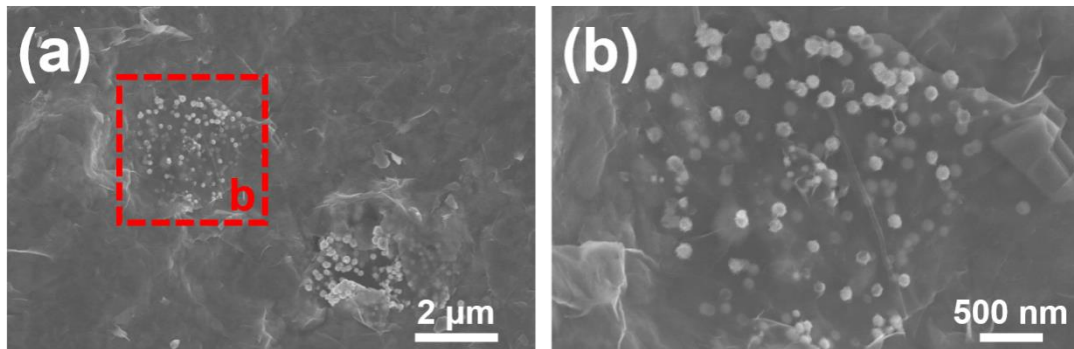
**Fig. S3** SEM image of MAX



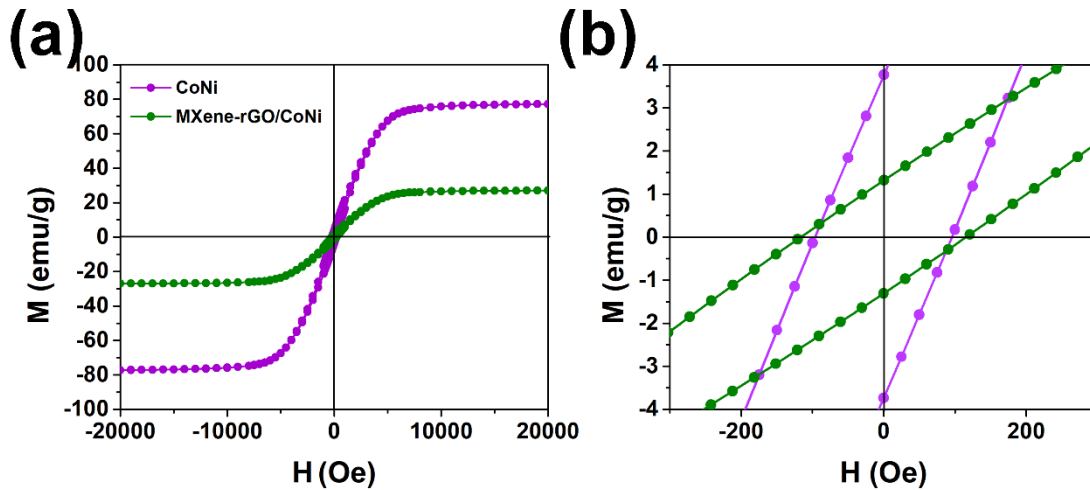
**Fig. S4** The AFM image of  $Ti_3C_2T_x$  MXene



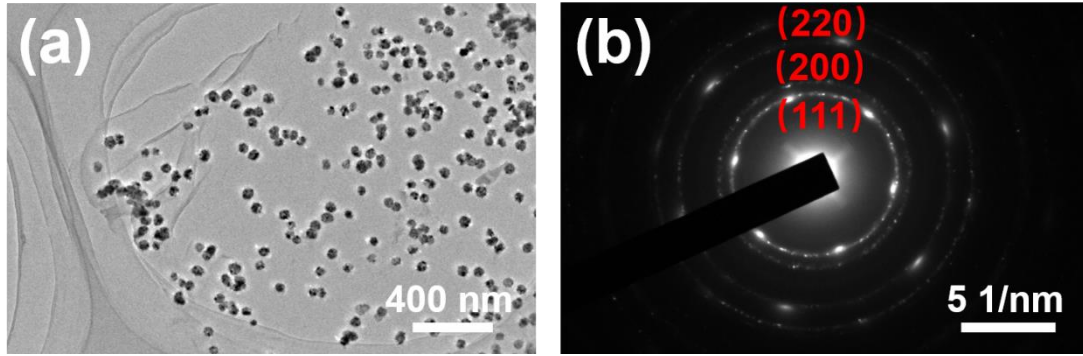
**Fig. S5** (a) SEM image and (b) cross-sectional SEM image of pure GO film



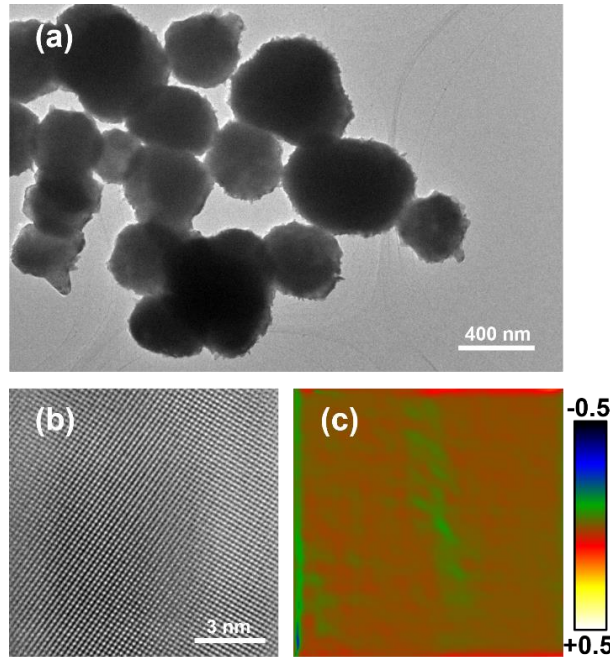
**Fig. S6** (a) SEM images and (b) magnified region of red line in (a) of of MXene-rGO/CoNi film



**Fig. S7** The hysteresis loop of CoNi and MXene-rGO/CoNi



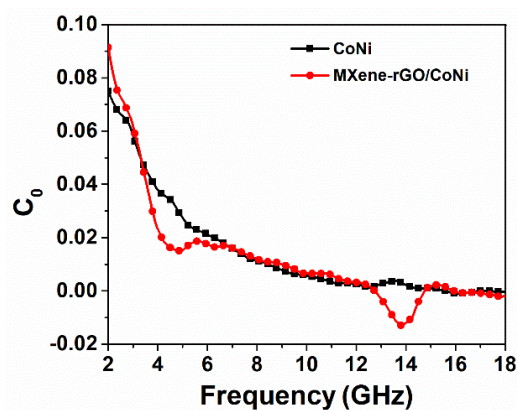
**Fig. S8** (a) TEM image and (b) SAED pattern of rGO/CoNi powder



**Fig. S9** (a) TEM image, (b) HRTEM and (c) corresponding strain maps of free-growing CoNi without rGO

**Table S1** The maximum reflection loss ( $RL_{\max}$ ) and effective absorption bandwidth (EAB) of MXene-rGO/CoNi and some  $Ti_3C_2T_x$  MXene-based absorbers reported previously

Samples	$RL_{\max}$ (dB)	EAB (GHz)	Refs.
$Ti_3C_2T_x$	-40.3	3.66	[S1]
Amorphous carbon- $Ti_3C_2T_x$	-48.6	2.8	[S2]
Carbon nanosphere- $Ti_3C_2T_x$	-21.3	3.2	[S3]
Cellulose- $Ti_3C_2T_x$	-43.4	4.5	[S4]
$Fe_3O_4$ - $Ti_3C_2T_x$	-53.4	1.5	[S5]
Ni- $Ti_3C_2T_x$	-49.9	2.1	[S6]
$Ni_{0.5}Zn_{0.5}Fe_2O_4$ - $Ti_3C_2T_x$	-42.5	3.0	[S7]
PVB/ $Ba_3Co_2Fe_{24}O_{41}$ / $Ti_3C_2T_x$	-46.3	1.6	[S8]
ZnO- $Ti_3C_2T_x$	-26.3	1.4	[S9]
MXene-rGO/CoNi	-54.1	4.9	This work



**Fig. S10** The  $C_0$  curves of rGO/CoNi and MXene-rGO/CoNi samples

## Supplementary References

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