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SUPPORTING INFORMATION

Superior to Graphene: Super-anticorrosive Natural Mica Nanosheets

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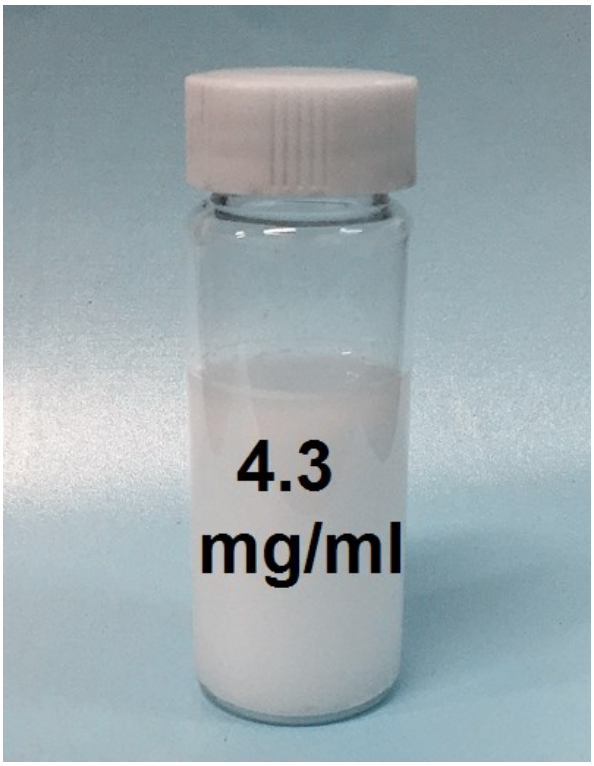

Figure S1. Digital photo of the high-concentration MNSs dispersion.

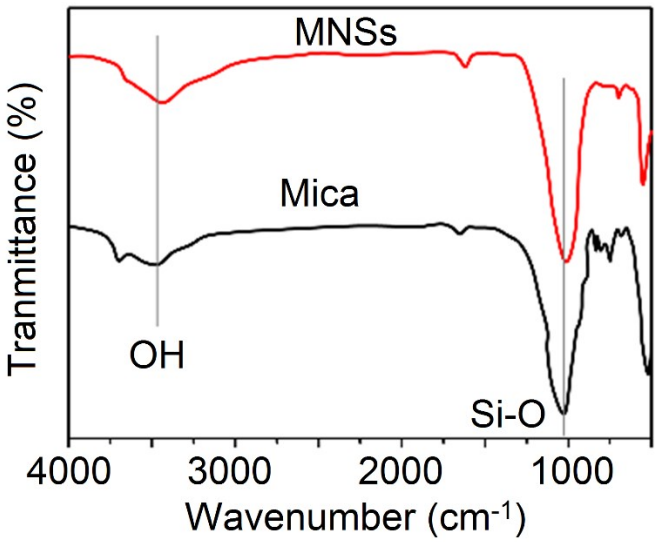

Figure S2. FTIR spectra of natural ground mica and as-exfoliated MNSs.

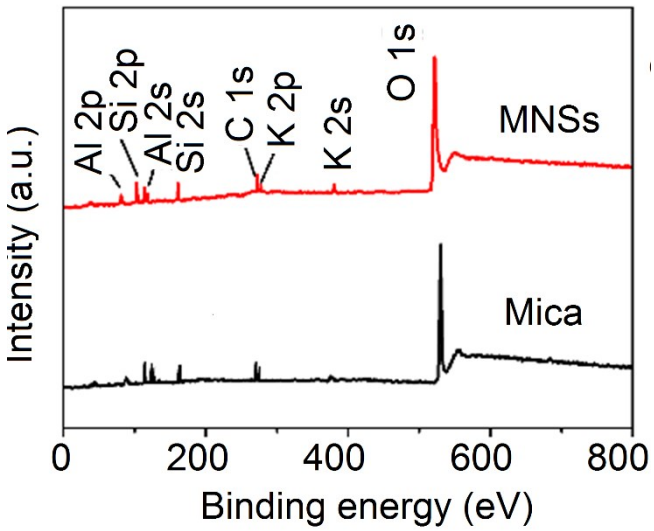

Figure S3. XRD patterns of natural ground mica and as-exfoliated MNSs.

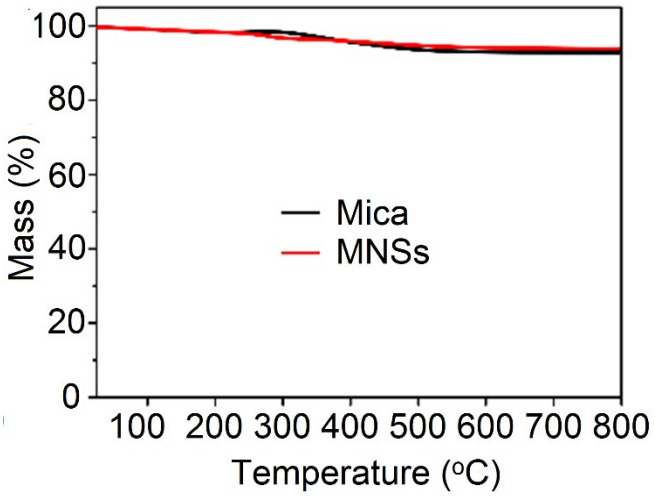

Figure S4. TGA curves of natural ground mica and as-exfoliated MNSs.

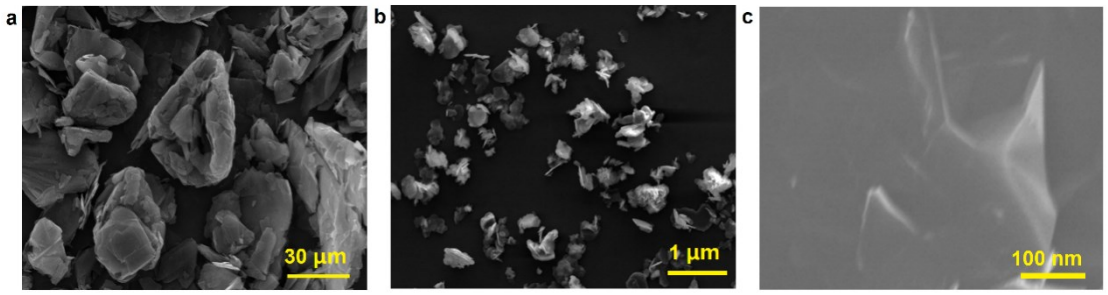

Figure S5. SEM images of natural ground mica (a) and mica nanosheets as-obtained (b, c), respectively. By comparing Fig. S1a to Fig.S1 b and c, the lateral size of MNSs are smaller than that of ground mica, revealing the ground has been successfully peeled through the proposed gas-assisted ball-milling strategy.

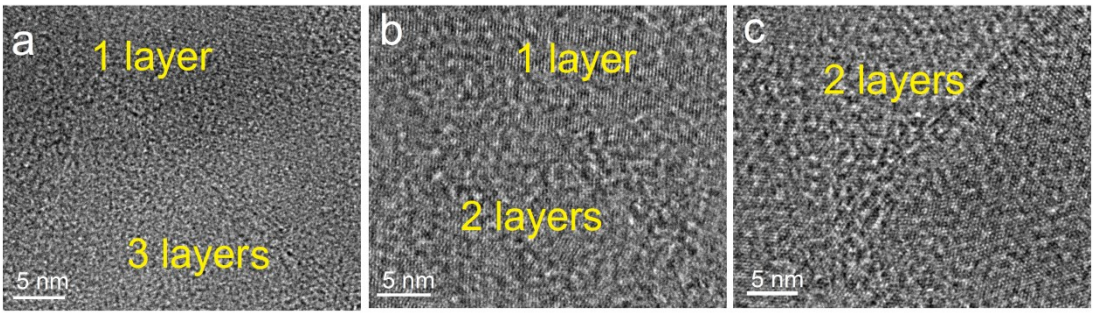

Figure S6. High-resolution TEM images of MNSs as-obtained.TEM is used to characterize the number of layers of MNSs that is unobservable in SEM measurements. Figure S2 exhibits many ultrathin mica nanosheets with layer of 1-3 layers. It's worth noting that, there is no more than 5 layers nanosheets are observed in HR-TEM images.

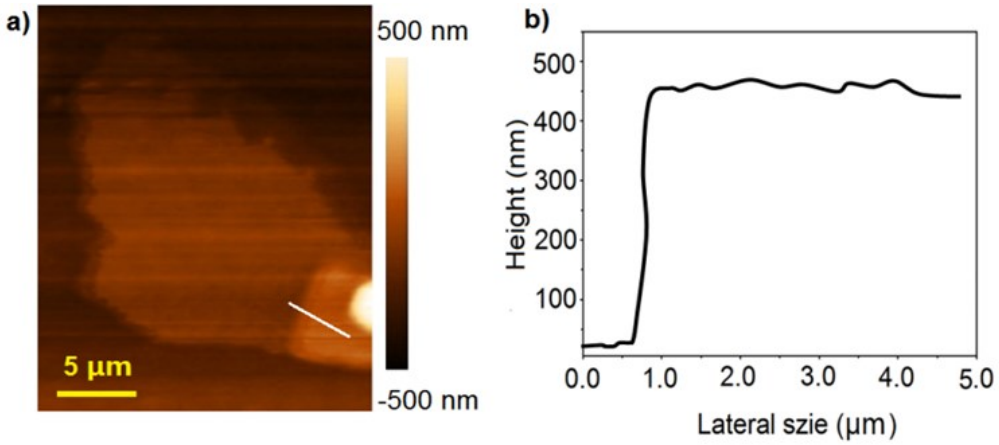

Figure S7. AFM image (a) and height profile (b) of natural ground mica. From Fig.S3a, the ground mica shows typical bulk structure with numerous stacking layers. The AFM in Fig.S3 shows the thickness of ground mica is about 472 nm, demonstrating their layered structure

Table S1. Elemental composition of ground mica and MNSs determined from XPS.

Sample	O	Si	Al	Mg	K
Ground mica	63.1%	17.7%	13.7%	1.9%	3.2%
MNSs	62.4%	17.5%	13.7%	2.1%	3.2%

Table S2. Mass loss of ground mica and MNSs determined from TGA curves.

Sample	Mass loss / wt.%
Ground mica	4.65
MNSs	4.61

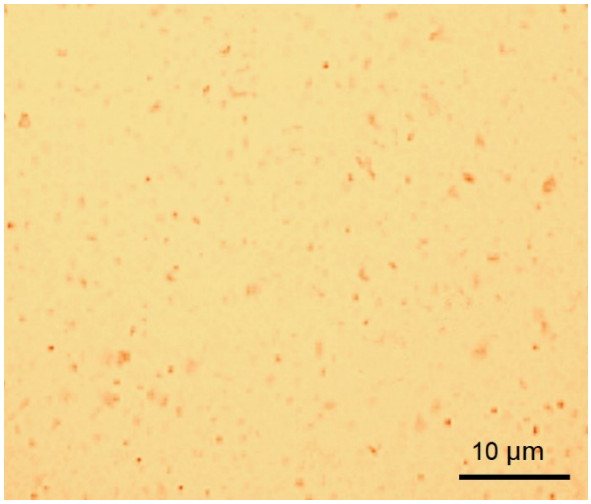

Figure S8. OM image of the $MNS_{1.0}$/EP solution.OM characterization can be directly observing the dispersed states of nanomaterials in the polymer matrix. As shown in Fig.S6, the single- and few-layer MNSs are uniformly and randomly dispersed in the epoxy matrix, demonstrating the good compatibility between the MNSs and the EP matrix.

Table S3. The preparation of MNS/EP coating specimens with different MNSs content.

Sample	Mass / mg	Fraction / wt.%
0	0	0
$MNS_{0.1}$/EP	10	0.1
$MNS_{0.2}$/EP	20.05	0.2
$MNS_{0.3}$/EP	30.01	0.3
$MNS_{0.4}$/EP	40.03	0.4
$MNS_{0.5}$/EP	50.05	0.5
$MNS_{1.0}$/EP $_0$	100.08	0.6

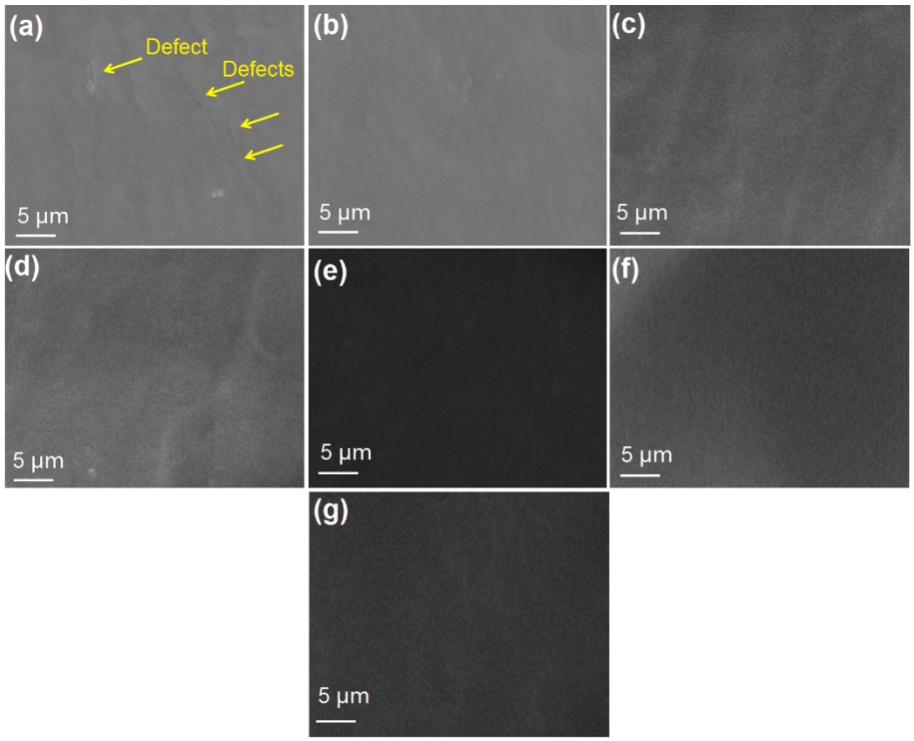

Figure S9. SEM images of pure epoxy and MNS/EP composite free-standing films: pure EP (a), $MNS_{0.1}$/EP (b), $MNS_{0.2}$/EP (c), $MNS_{0.3}$/EP (d), $MNS_{0.4}$/EP (e), $MNS_{0.5}$/EP (f), $MNS_{1.0}$/EP (g) composites. The yellow arrows in (a) exhibit the numerous bobbles and defects appearing in pure epoxy matrix due to the rapid evaporation of solvents during the preparation and curing process.

Table S4. The electrochemical parameters of different MNS/EP specimens after 60 days of immersion in 3.5 wt. % NaCl solution.

Sample	R_s/Ω cm^2	C_c/ F cm^{-2}	R_c/Ω cm^2	C_{dl}/ F cm^{-2}	R_{ct}/Ω cm^2
0	11±2.4	$1.85±4.1\times10^{-8}$	$1.15±0.53\times10^{6}$	$4.48±0.65\times10^{-4}$	$1.26±0.16\times10^{6}$
$MNS/EP_{0.1}$	14±1.7	$8.2±0.98\times10^{-9}$	$5.73±0.13\times10^{8}$	-	-
$MNS/EP_{0.2}$	12±3.3	$6.6±0.65\times10^{-9}$	$3.61±0.22\times10^{9}$	-	-
$MNS/EP_{0.3}$	17±2.0	$8.1±0.77\times10^{-10}$	$8.57±0.35\times10^{9}$	-	-
$MNS/EP_{0.4}$	13±3.5	$3.9±0.32\times10^{-10}$	$1.85±0.68\times10^{10}$	-	-
$MNS/EP_{0.5}$	15±3.6	$2.5±0.62\times10^{-10}$	$2.79±0.54\times10^{10}$	-	-
$MNS/EP_{1.0}$	17±1.6	$2.2±0.72\times10^{-10}$	$2.77±0.65\times10^{10}$	-	-

Table S5. The electrochemical parameters of different CGNS/EP specimens after 60 days of immersion in 3.5 wt. % NaCl solution.

Sample	R_s/Ω cm^2	C_c/ F cm^{-2}	R_c/Ω cm^2	C_{dl}/ F cm^{-2}	R_{ct}/Ω cm^2
0	11±2.4	$1.85±4.1\times10^{-8}$	$1.15±0.53\times10^{6}$	$4.48±0.65\times10^{-4}$	$1.26±0.16\times10^{6}$
$CGNS/EP_{0.1}$	16±3.4	$9.2±1.11\times10^{-9}$	$1.08±0.13\times10^{8}$	-	-
$CGNS/EP_{0.2}$	16±3.7	$8.1±1.25\times10^{-9}$	$6.43±0.22\times10^{8}$	-	-
$CGNS/EP_{0.3}$	12±2.0	$3.3±0.47\times10^{-9}$	$3.12±0.45\times10^{9}$	-	-
$CGNS/EP_{0.4}$	13±2.4	$1.3±0.55\times10^{-9}$	$8.23±0.64\times10^{9}$	-	-
$CGNS/EP_{0.5}$	17±2.1	$8.3±0.75\times10^{-10}$	$8.36±0.42\times10^{9}$	-	-
$CGNS/EP_{1.0}$	14±3.3	$7.9±0.58\times10^{-10}$	$8.34±0.21\times10^{9}$	-	-

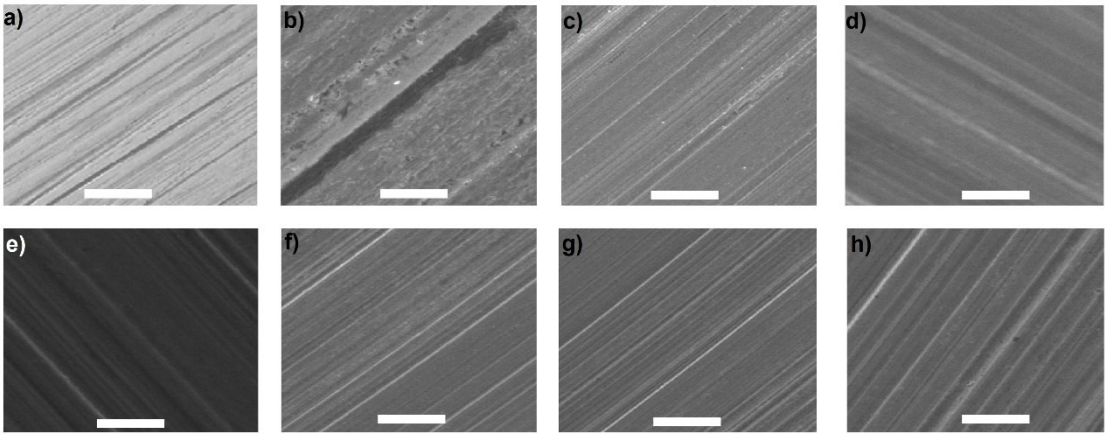

Figure S10. SEM image of freshly polished CS surface with clearly grooves. SEM images of CS substrates coated by pure EP (b), $MNS_{0.1}$/EP (c), $MNS_{0.2}$/EP (d), $MNS_{0.3}$/EP (e), $MNS_{0.4}$/EP (f), $MNS_{0.5}$/EP (g), and $MNS_{1.0}$/EP (h) after 60 days of immersion.

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