Supplementary Material (ESI) for Physical Chemistry Chemical Physics
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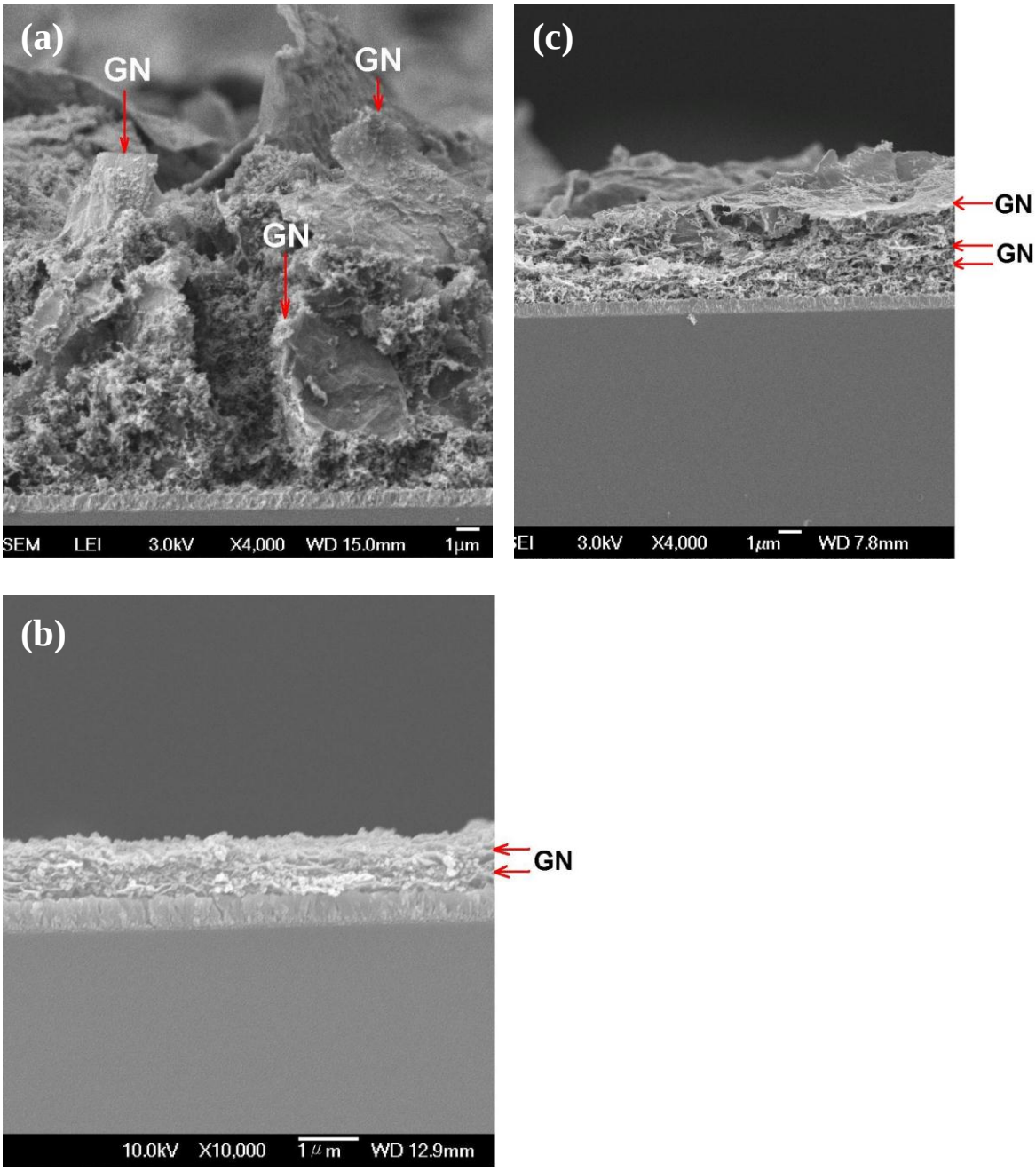
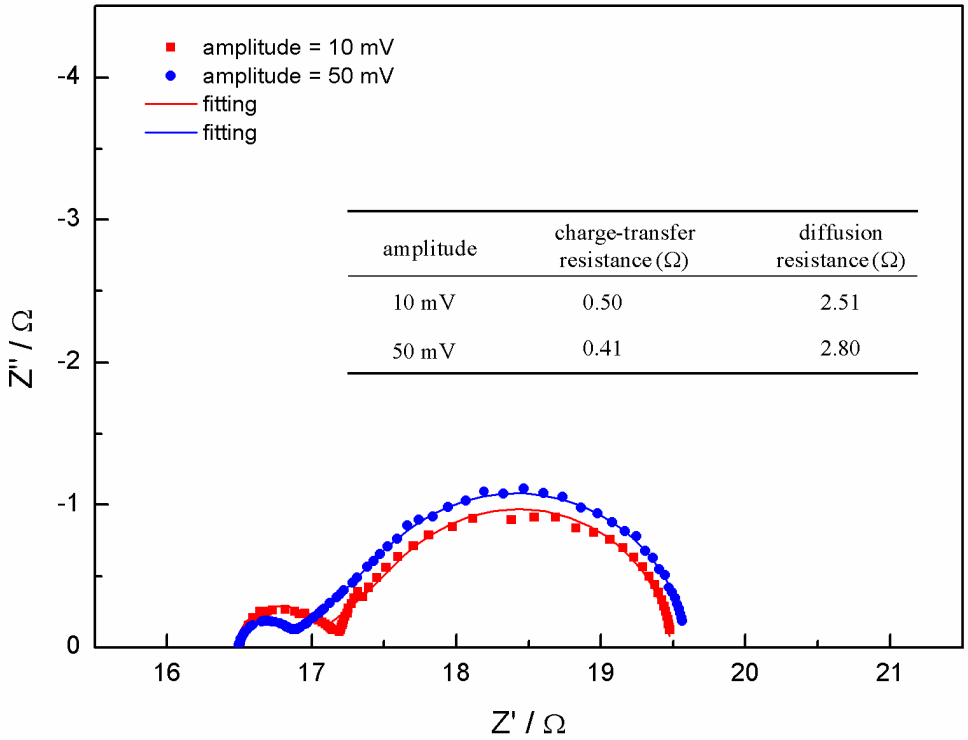


Fig. S1 Cross-sectional SEM micrographs of the (a) AC film with randomly and vertically embedded GNs, (b) AC film with randomly and horizontally embedded GNs prepared by spin-coating method, and (c) AC film with randomly and horizontally embedded GNs. The fraction ratio of the AC/GN for the spin-coating is 15/5.



amplitude	charge-transfer resistance (Ω)	diffusion resistance (Ω)
10 mV	0.50	2.51
50 mV	0.41	2.80

Fig. S2 Nyquist plots of a symmetric cell with two identical GN-embedded AC cathodes (AC film with randomly and vertically embedded GNs) at various ac amplitudes. The simulated charge-transfer and diffusion resistances were listed in a Table shown in the inset.

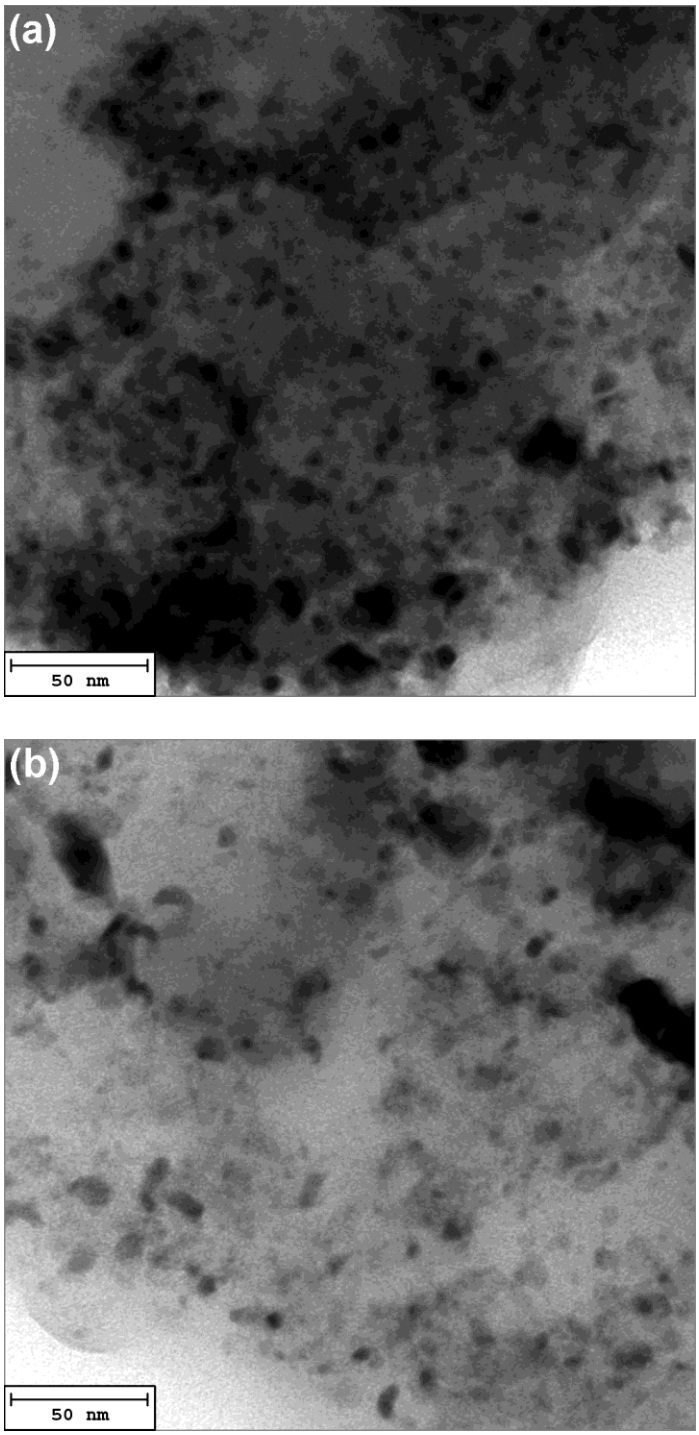


Fig. S3 TEM images of the (a) AC film with randomly and vertically embedded GNs and (b) AC film with randomly and horizontally embedded GNs. TEM samples were prepared by the following procedure: the GN-embedded AC films after annealed at 500°C for 1 h were stripped off and dispersed in ethanol with ultrasonic vibration for 5 min, a drop of the supernatant was then transferred onto a standard holey carbon-covered-copper TEM grid.