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Electrical percolation characteristics of metallic single-walled carbon nanotube networks by vacancy evolution

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AFM images

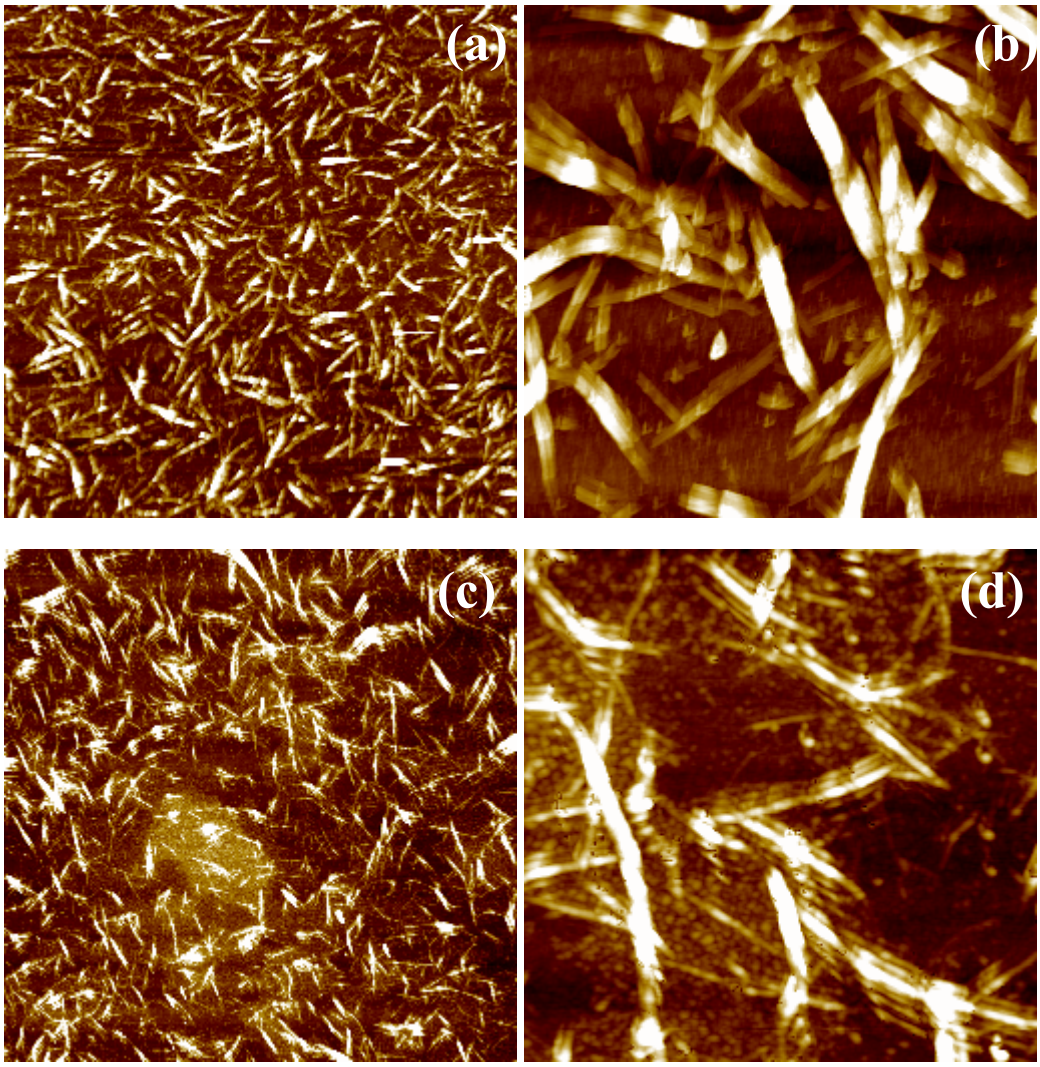

Fig. S1 AFM images of m-SWCNT networks (a, b) before and (c, d) after developing carbon vacancies by exposing the networks to air at 250 ºC for 8 hr in the presence of the catalyst nanoparticles (NPs). The images are 10 μm × 10 μm (a, c) and 2 μm × 2 μm (b, d).

As shown in Fig. S1 (a) and (b), pristine m-SWCNTs are evenly networked between source and drain electrodes on Si substrate in the absence of cobalt oxide catalyst. However, Fig. 1(c) shows that the density of m-SWCNT networks decreased after vacancy evolution by oxidizing the networks in air for 8 hr in the presence of the catalyst. Fig. S1(d) displays that cobalt oxide NPs formed in m-SWCNT networks and Si substrate after vacancy evolution. These results are consistent with the current-voltage measurement of FET, where the source-drain current continuously decreases as the vacancy developed in the networks.