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Electronic Supplementary Information

Magnetoelectric Coupling in Nanoscale 0-1 Connectivity

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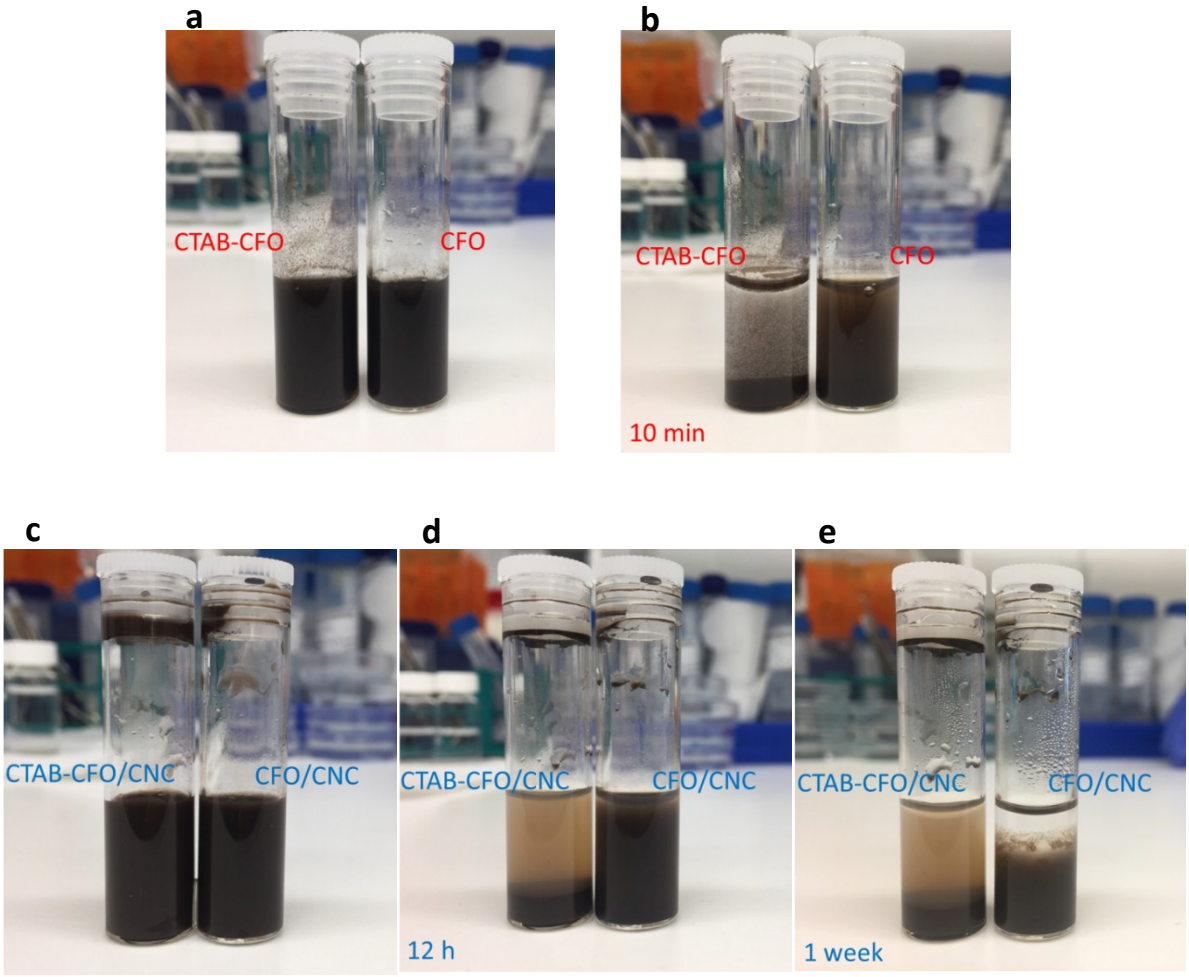


Fig. S1. (a,b) Dispersion of CTAB-CFO and CFO nanoparticles in Di water (a) right after sonication and (b) after standing still for 10 min. (c-e) Dispersion of CTAB-CFO/CNC and CFO/CNC (c) right after sonication and after standing still for (d) 12 h and (e) 1 week.

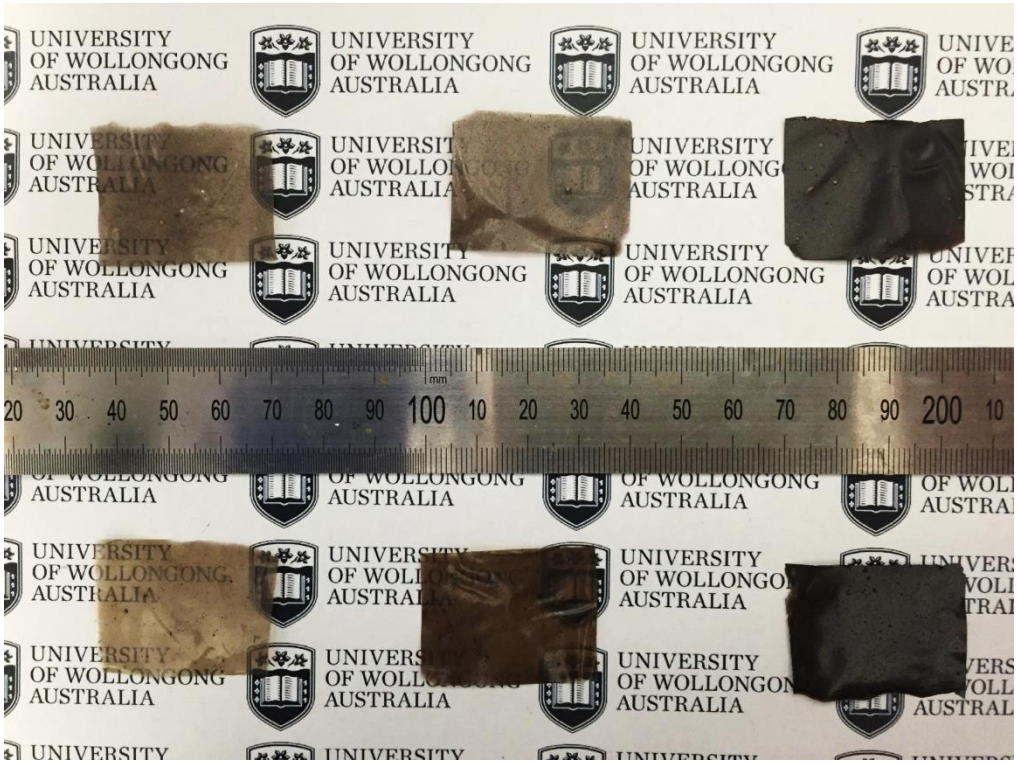


Fig. S2. Appearance of CFO/CNC (upper row) and CTAB-CFO/CNC (bottom row) composites with different MS nanoparticle concentrations of 5, 10 and 20 wt% (from left to right).

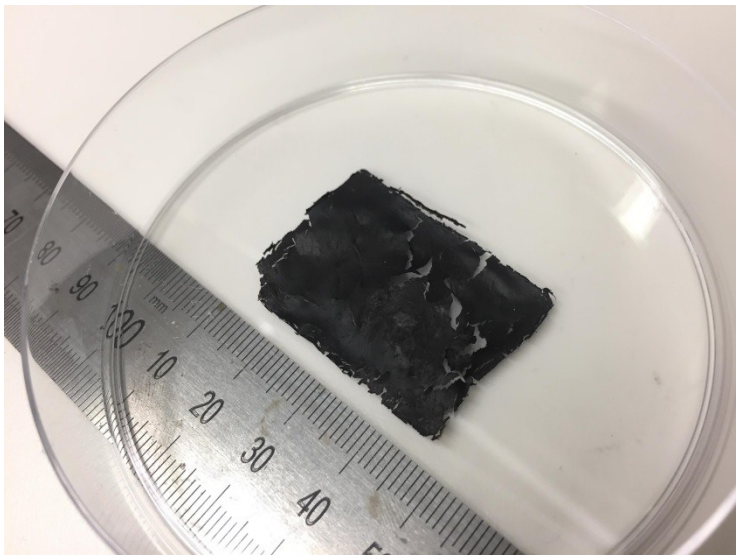


Fig. S3. Representation of cracked sample with high magnetostrictive concentration. The sample is CFO/CNC composite containing 25 w.t.% of CFO nanoparticles (CFO:CNC=1:3).

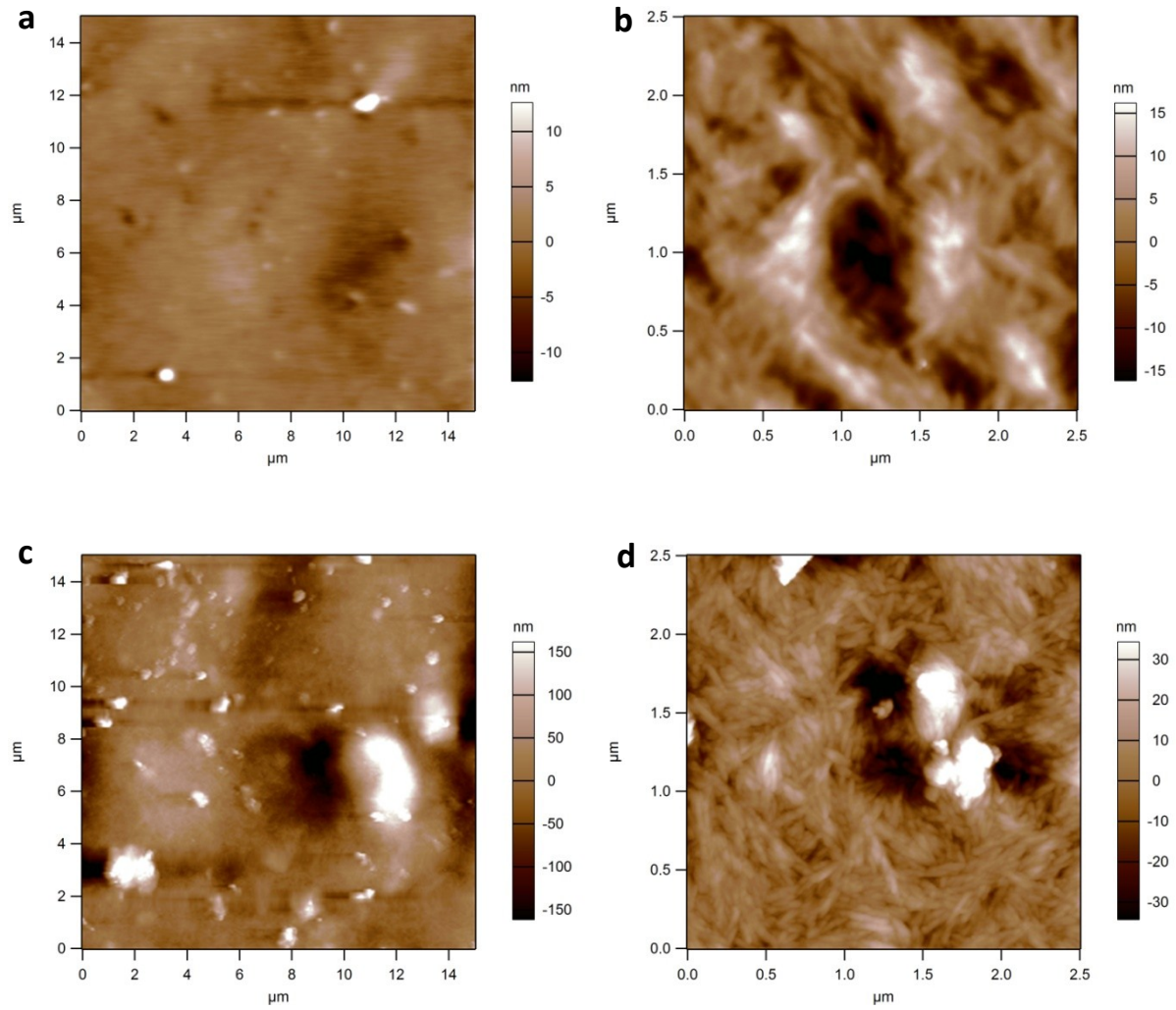


Fig. S4. (a,b) Morphology of CFO/CNC composite with scanning size of (a) 15 µm ×15 µm and (b) 3 µm × 3 µm. (c,d) Morphology of CTAB-CFO/CNC composite with scanning size of (c) 15 µm ×15 µm and (d) 3 µm × 3 µm.

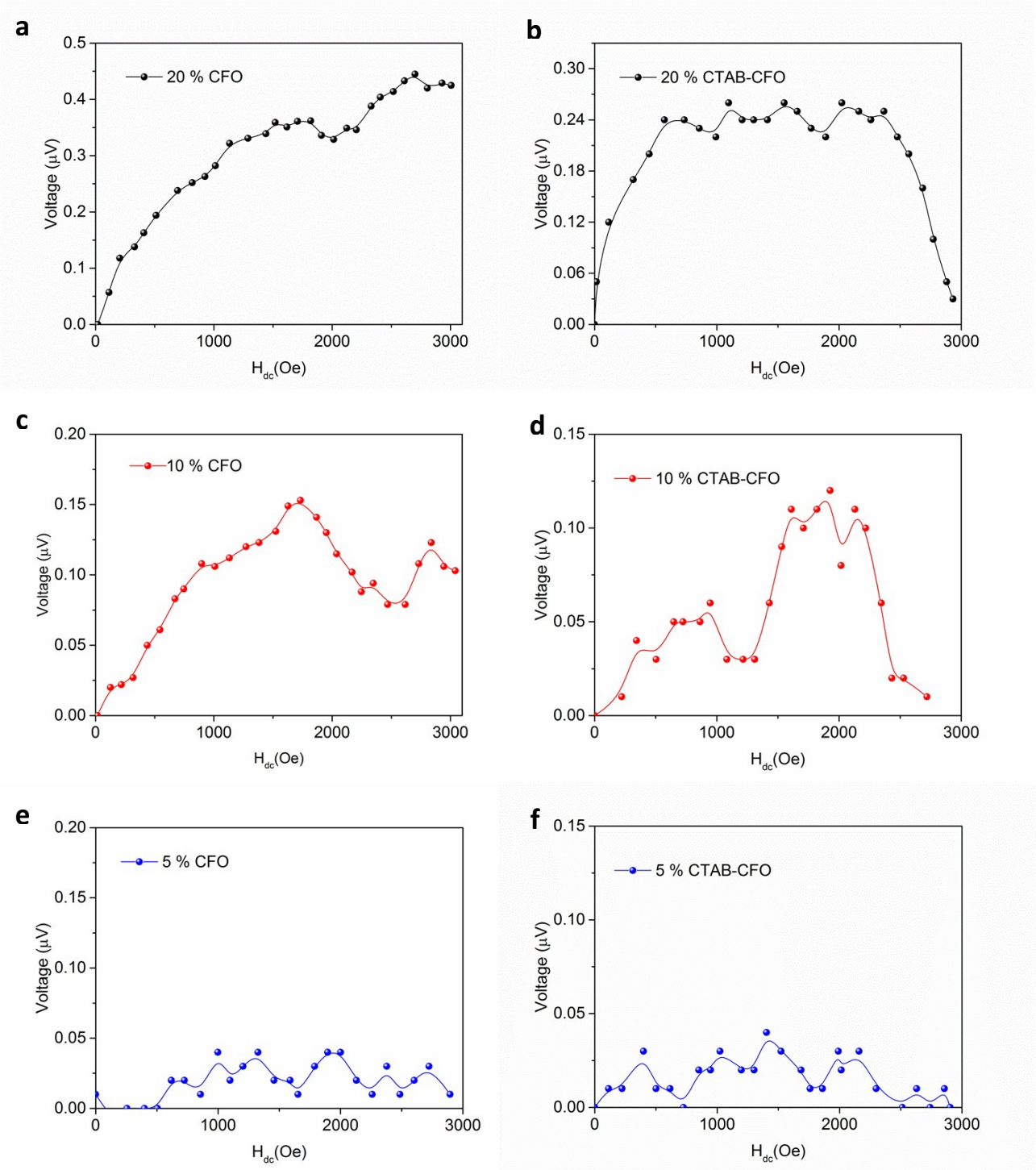


Fig. S5. Magnetically induced voltage as a function of H_{dc} for CFO/CNC composites containing (a) 20 w.t.%, (c) 10 w.t.% and (e) 5 w.t.% of CFO nanoparticles; and CTAB-CFO/CNC composites containing (b) 20 w.t.%, (d) 10 w.t.% and (f) of 5 w.t.% CFO nanoparticles. The thicknesses of measured samples were: (a) 55, (b) 77, (c) 59, (d) 75, (e) 56 and (f) 71 μm.

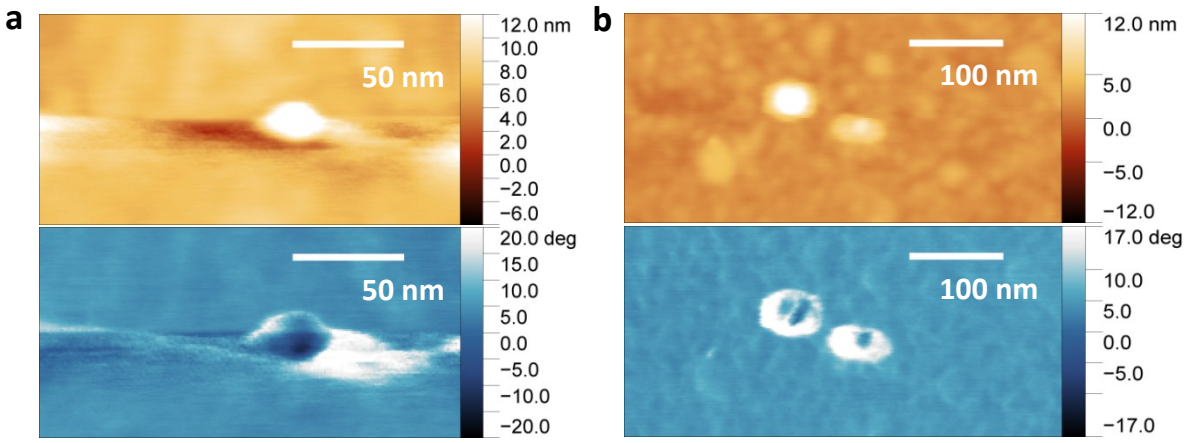
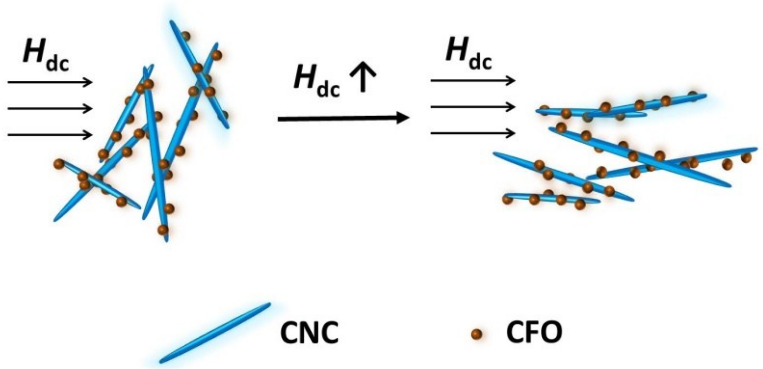


Fig. S6. (a,b) AFM height (upper) and phase (bottom) images of (a) CFO and (b) CTAB-CFO nanoparticles. The scanning size was (a) 250 μm × 125 μm (Length-Height) for CFO and (b) 500 μm × 250 μm (Length-Height) for CTAB-CFO.



Scheme 1. Scheme of the alignment process of CFO nanoparticles attached CNC nanowhiskers in an increasing H_{dc} magnetic field.