†Electronic Supplementary Information (ESI)

High performance magnetically controllable microturbines †

Ye Tian,[a] Yong-Lai Zhang,*[a] Jin-Feng Ku,[a] Yan He,[a] Bin-Bin Xu,[a] Qi-Dai Chen,[a] Hong Xia,[a] and Hong-Bo Sun*[a,b]

Characterization.

TEM images were obtained using JEOL JEM-2010 transmission electron microscope at 200 kV. The VSM data were measured by TDM-B vibrating sample magnetometer. The FT-IR spectra were obtained by a Thermo Scientific Nicolet 6700 FT-IR spectrophotometer. Thermogravimetric (TG) curves were obtained from NETZSCH STA 449C. The samples were heated from room temperature to 800 °C at a heating rate of 10 °C/min under nitrogen atmosphere. The SEM images were captured on a JEOL JSM-7500F field emission scanning electron microscope (8.0 kV). The AFM images were obtained using a NanoWizard II BioAFM (JPK Instrument AG, Berlin, Germany) in the tapping mode.

Driving instrument for microturbine rotation

Driving instrument for the microturbines was setted by fixing a commercial NdFeB magnet on the Al cylinder which is driven by an electric motor to generate a magnetic field. The system was placed on an optical microscope equipped with a CCD camera monitoring the rotation. The microturbine which was immersed in organic solvent such as acetone or ethanol and the field strength was 3000Gs obtained at this position (Figure S2).

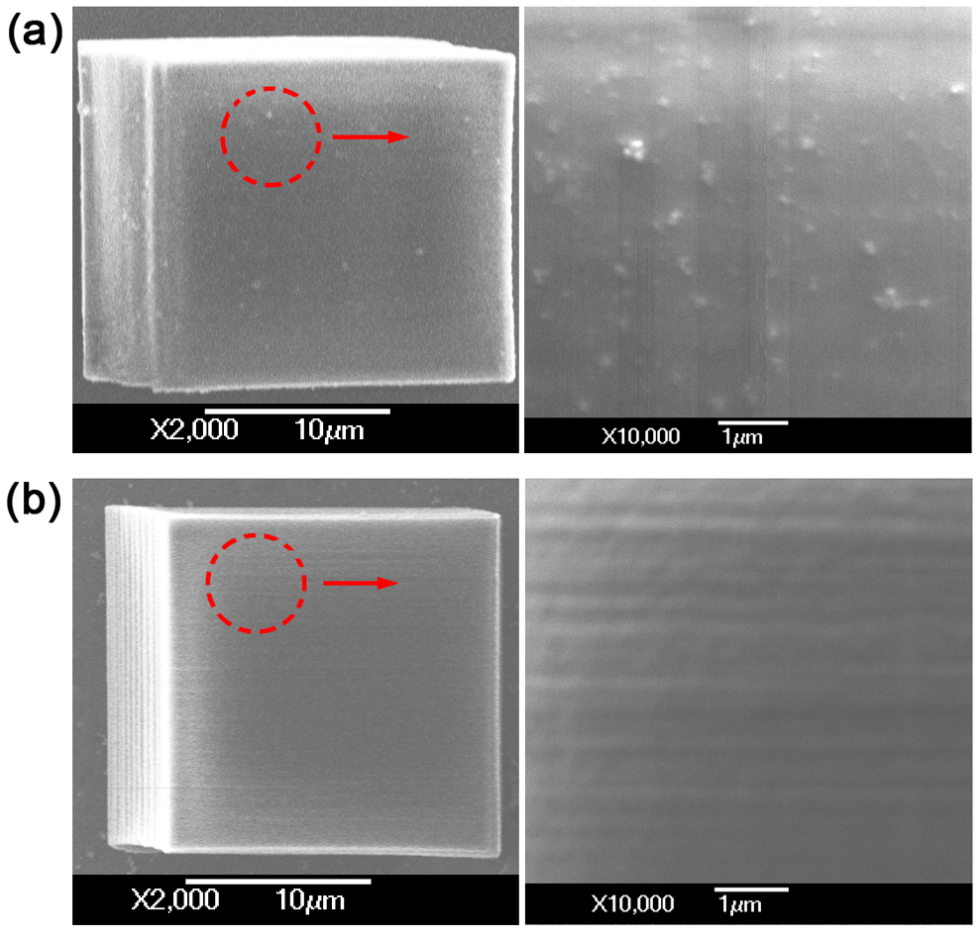

Fig. S1 SEM images of microcubes which contain (a) coprecipitation-synthesized nanoparticles and (b) thermal-decomposition-synthesized nanoparticles.

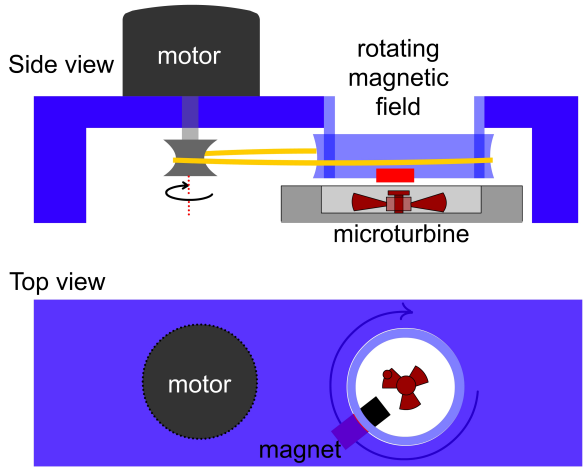

Fig. S2 Sketch of rotating magnetic field for driving the microturbine.

Supporting videos:

Supporting Video S1. Rotating process of microturbine containing coprecipitation-synthesized Fe_3O_4 nanoparticles.

Supporting Video S2. Rotating process of microturbine containing PO_3-TMPTA modified Fe_3O_4 nanoparticles prepared by thermal-decomposition