

Electronic Supplementary Information

Autonomous Micromotors Based on Catalytically Pneumatic Behavior of Balloon-like MnO_x/graphene Crumples

Xueli Chen^{a,b}, Guan Wu^a, Tian Lan^a and Wei Chen*^a

^aI-Lab, Suzhou Institute of Nano-Tech and Nano-Bionics Chinese Academy of Sciences, Suzhou, 215123, China.

^bUniversity of Science and Technology of China, Anhui, 230026, China

E-mail: wchen2006@sinano.ac.cn

Synthesis of MnO_x/graphene crumples

GO was synthesized from natural graphite flake (325 mesh, 99.8%, ABCR GmbH & Co. KG) by a modified Hummers method. The MnO_x/graphene crumples were synthesized by the ultrasonic spray pyrolysis method. Briefly, graphene of 2mg/ml and KMnO₄ of 4mM were dispersed in water under ultrasonic oscillator of 90% power for 2.5 hour at room temperature. Then a homogeneous dispersion was gotten. The mixture was poured into the ultrasonic atomizer (2.4MHz, 241TM, Sonaer). The colloidal droplets sprayed from the precursor were blew through the tubular furnace by nitrogen at 300°C. The speed of the N₂ was 1.5 L/min. Then the aluminum foil was placed at the end of the tubular furnace to collect the MnO_x/graphene crumples.

The morphology and microstructure of the samples were investigated by SEM (Hitach S-4800 field emission scanning electron microscope), TEM (Tecnai G2 F20 S-Twin) and HRTEM (Tecnai G2 F20 S-Twin). The XRD (X'Pert-Pro MPD (Cu-Ka)) were used to analyse the crystal from of the MnO_x. At last the characterization of the

MnO_x/graphene crumples was observed by microscope (Olympus BX51) and through the method of making a model.

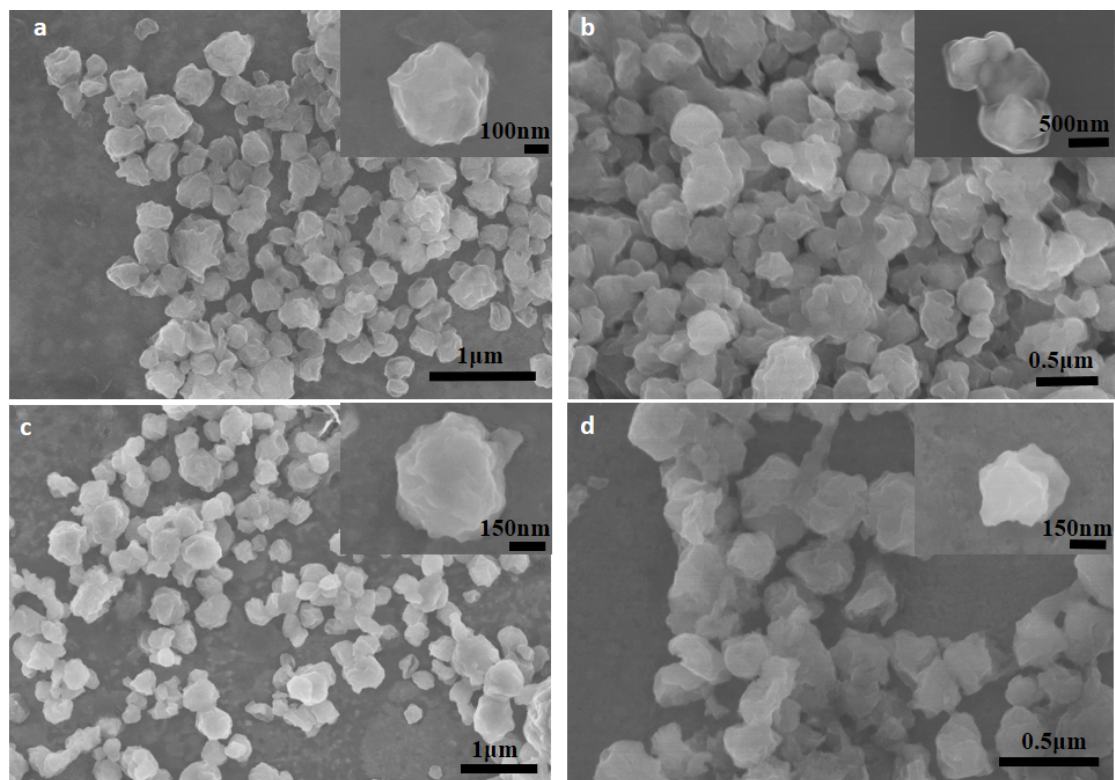


Figure S 1. MnO_x/graphene crumples of different batches synthesized at 300°C when the ratio of KMnO₄ was 4mM.

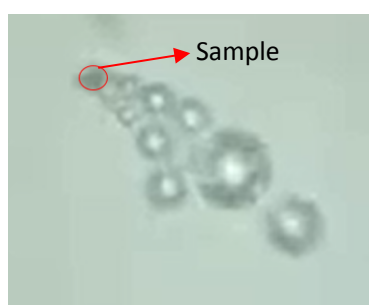


Figure S 2. An image of one Balloon-like micromotor moving along one direction captured from ESI video # 1.