Supporting Information

Breathing catalyst-supports: CO_2 adjustable and magnetic recyclable "smart" hybrid nanoparticles

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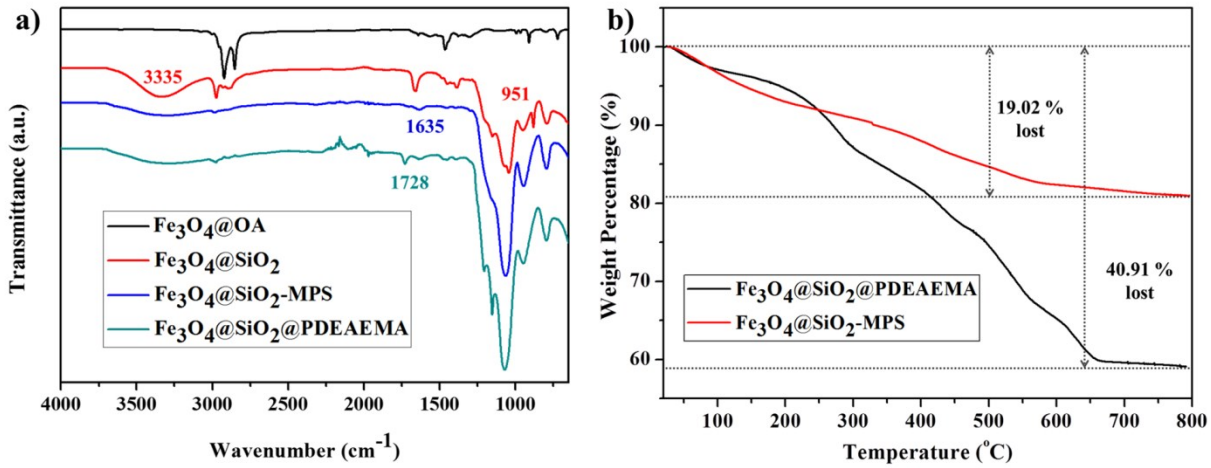

Fig. S1 a) FT-IR spectra of Fe_3O_4@OA, Fe_3O_4@SiO_2, Fe_3O_4@SiO_2-MPS and Fe_3O_4@SiO_2@PDEAEMA. b) TGA curves of Fe_3O_4@SiO_2-MPS and Fe_3O_4@SiO_2@PDEAEMA.

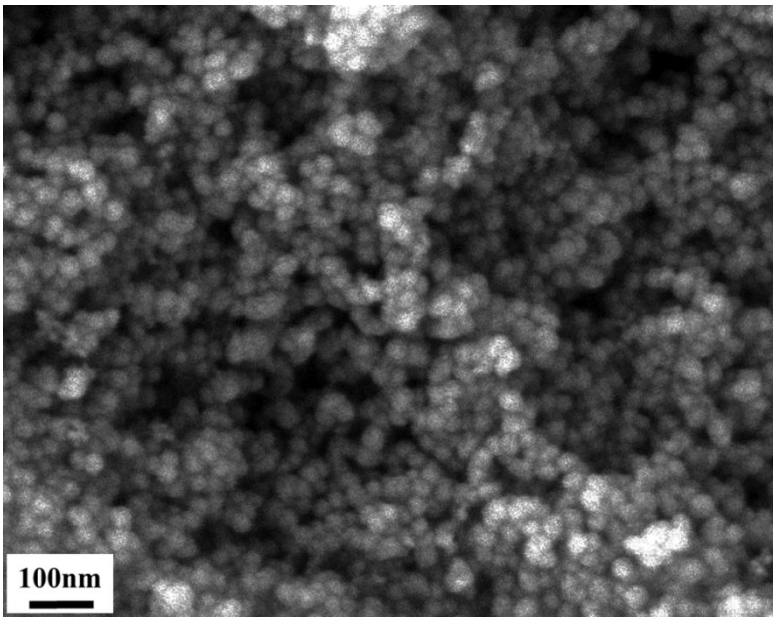

Fig. S2 SEM image of Fe_3O_4@SiO_2-PDEAEMA hybrid microspheres.

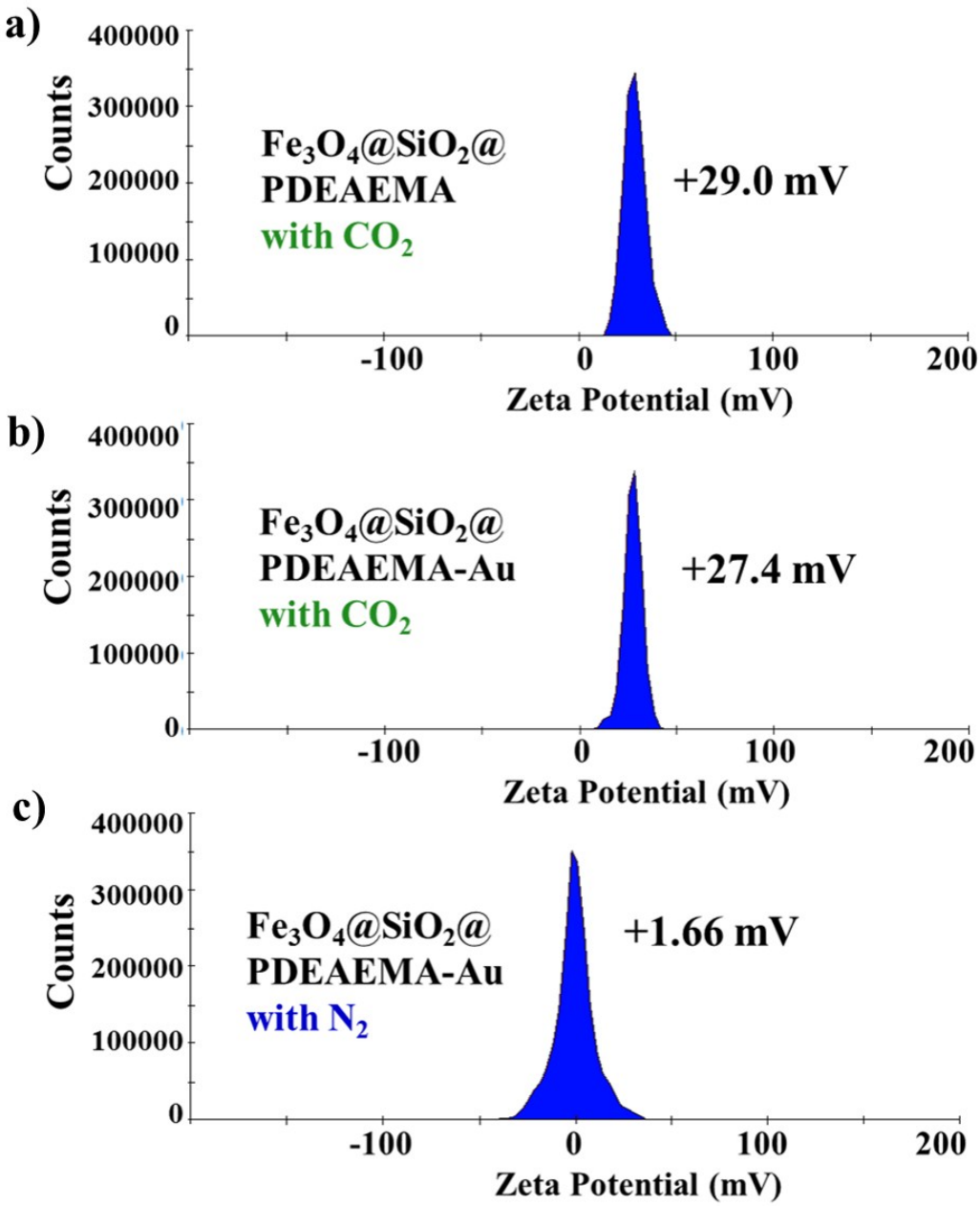

Fig. S3 Zeta potential of a) Fe_3O_4@SiO_2@PDEAEMA nanoparticles after treatment of CO_2; b) Fe_3O_4@SiO_2@PDEAEMA-Au nanocomposites after treatment of CO_2; c) Fe_3O_4@SiO_2@PDEAEMA-Au nanocomposites after treatment of N_2.

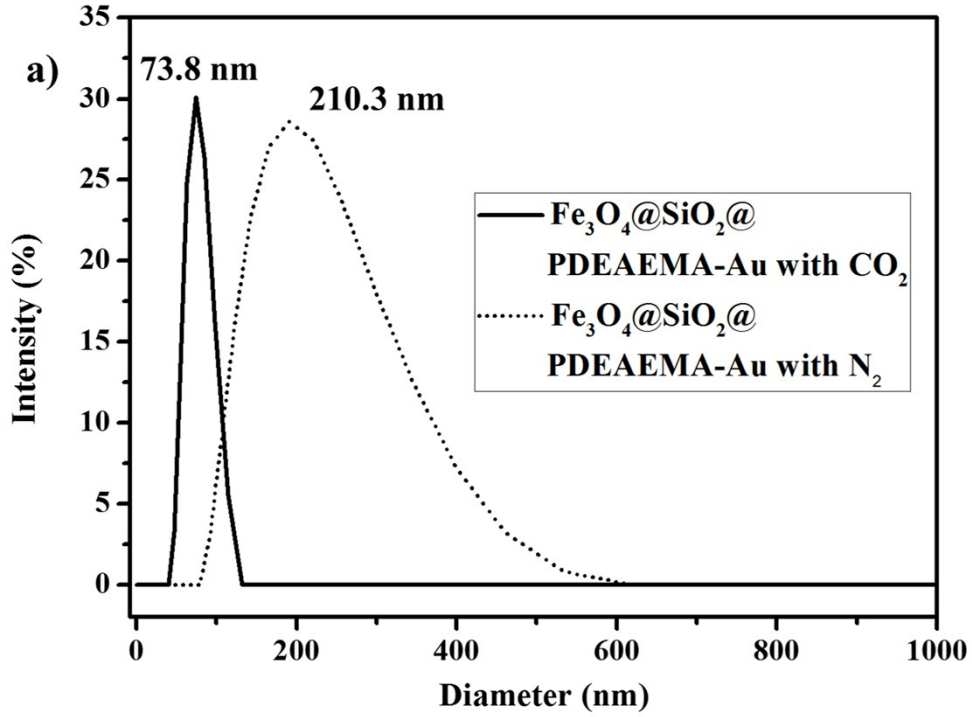

Fig. S4 The average diameter of Fe_3O_4@SiO_2-PDEAEMA-Au nanocomposites by DLS after CO_2 and N_2 purging for 15 min.

Determination of mass ratio of polymer through TGA data

Based on the TGA results, we can assume that there was 80.98 g residuum in 100 g of Fe_3O_4@SiO_2. Same component of residuum will be kept for the sample of Fe_3O_4@SiO_2@PDEAEMA, as the polymer component should be removed totally at 800 °C. The mass of PDEAEMA can be calculated as 80.98 g/(1-40.91 %)-100 g, resulted in 37.05 g. Therefore, the mass ratio of polymer can be decided as 37.05 g/ (100 g+37.05g) = 27.04 wt %.