SUPPORTING INFORMATION

In vitro Evaluation of PEGylated Mesoporous $MgFe_2O_4$ Magnetic Nano assemblies (MMNs) for Chemo-thermal Therapy

Sunil Kumar [a], Amita Daverey[b #], Niroj Kumar Sahu[b], and Dhirendra Bahadur[b]*

[1]Department of Chemical Engineering, [2]Department of Metallurgical Engineering and Materials Science, Indian Institute of Technology Bombay, Mumbai-400076, India

#Present Address

Department of Chemical and Biomolecular Engineering, University of Nebraska, Lincoln, NE-68588. USA.

*E-mail: dhirenb@iitb.ac.in Tel: +91 22 25767632, Fax: +91 22 2576 3480

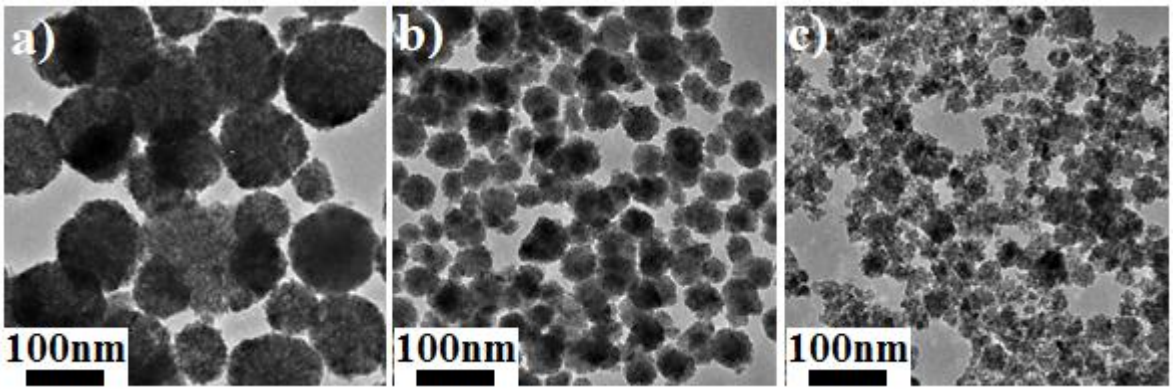
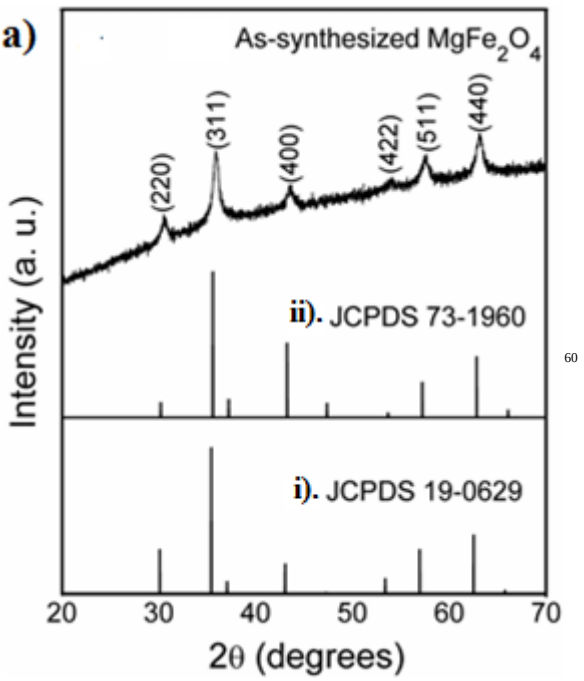


Fig S1. Effect of sodium borohydride ($NaHB_4$) addition on the morphology of MMNs. TEM images of the MMNs prepared by polyol method with 1 g $FeCl_3.6H_2O$, $MgCl_2.6H_2O$, 3 g NaAc, 3.5 g PEG-diacid in 20 mL EG at 200^0C for 8 h. (a) without sodium borohydride ($NaHB_4$, size > 200nm),(b) with addition of sodium borohydride (0.05g, size<100nm), (c) 0.1g $NaBH_4$ results in small size flower like morphology of MMNs.



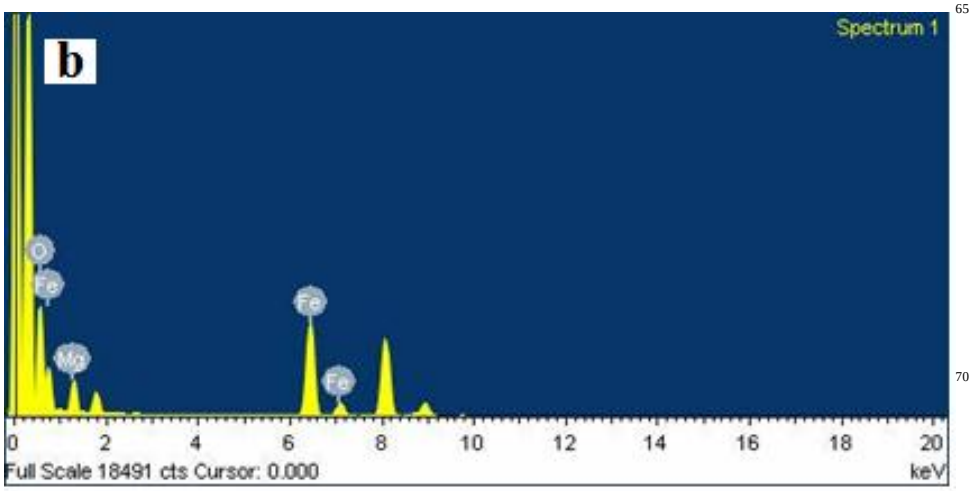


Fig S2. (a) XRD patterns of as-synthesized MMNs with the JCPDS Card No- (i) 19-0629 for Fe_3O_4 and (ii) 73-1960 for $MgFe_2O_4$.(b) EDX analysis confirm the composition of MMNs.

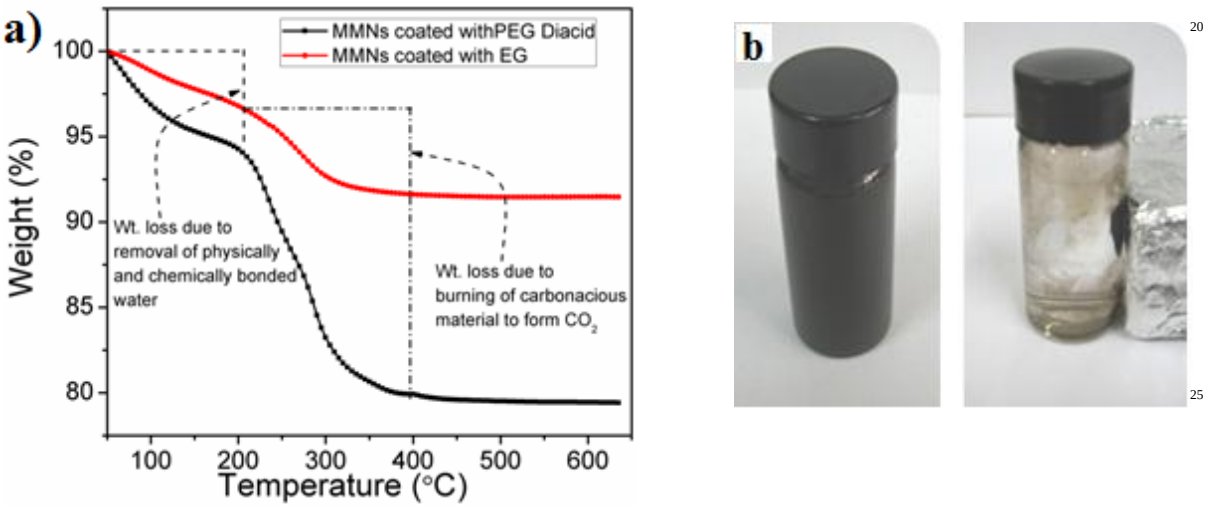


Fig S3. (a) Thermo gravimetric (TG) curves of the MMNs coated with (black line) and without (red line) PEG-diacid. (b) Pictures showing colloidal stability of MMNs in PBS (5mg/mL) due to PEG-diacid and its attraction towards magnetic field.

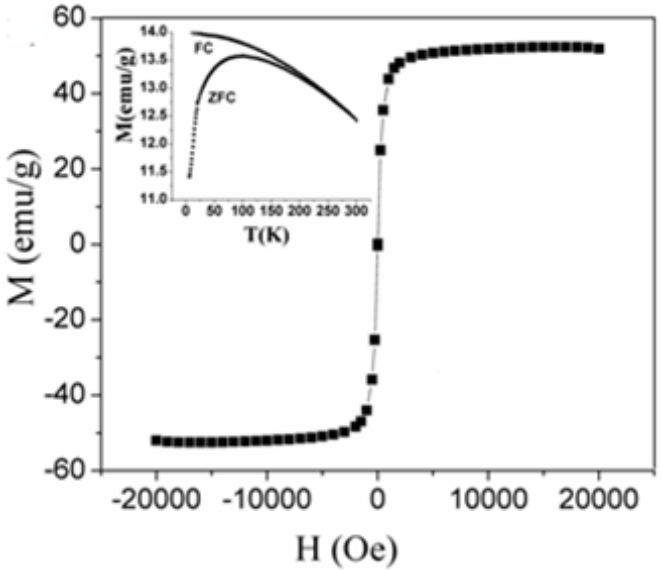


Fig S4. *M-H* loops of as-synthesized MMNs with the applied field of 2T and measured at 300 K. Inset: ZFC-FC curves measured in the temperature range of 5-300 K with an applied field of 500 Oe.

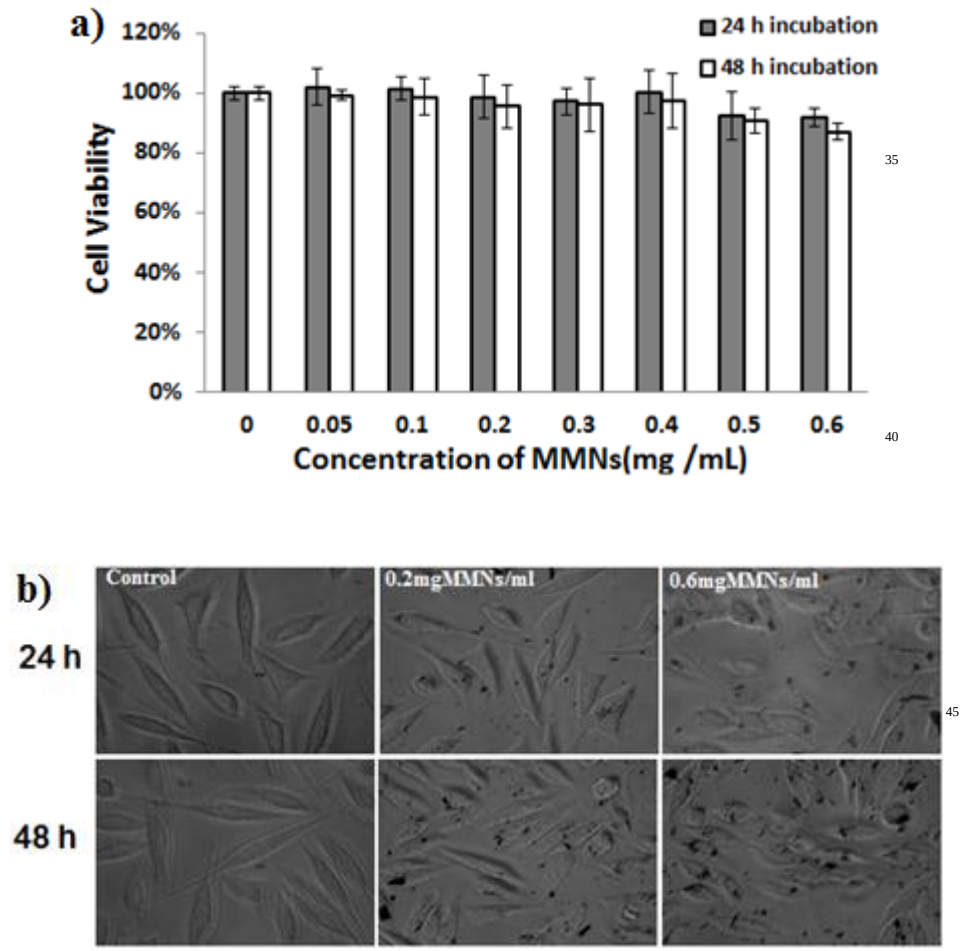


Fig S5. *In vitro* biocompatibility of MMNs using L929 cells: (a) Graphical representation of % cell viability after 24 and 48 h incubation of Bare MMNs with indicated concentration. Results were quantified by subtracting the blank value from each value then normalizing against the control values. Data shown are mean ± SD from n=3. (b) Representative photographs of L929 cells showing morphology before and after treatment with MMNs.

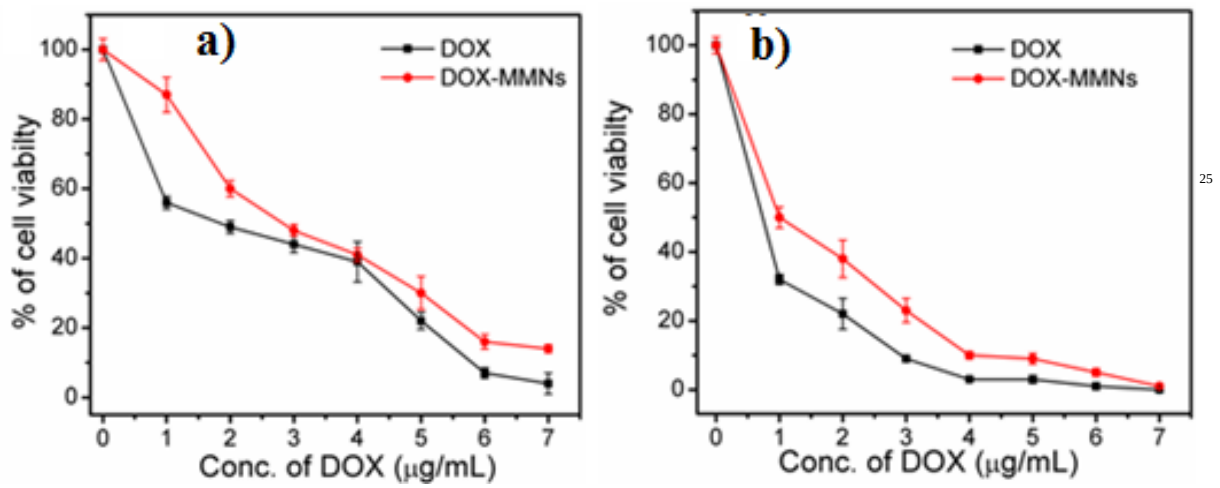


Fig S6. *In-vitro* antitumor efficacy of DOX-MMNs. Graphs shows doxorubicin concentration response on cell survival after treatment with free doxorubicin and DOX-MMNs for (a) 24 and (b) 48 h. The concentration of DOX-MMNs which corresponds to DOX was 10, 20, 40, 60, 80, 100 and 150 μg/mL. Absorbance of the bio-reduced soluble formazan product was measured at 490 nm. Results were quantified by subtracting the blank value from each value then normalizing against the control values. Data shown are mean ± SD from n= 3.

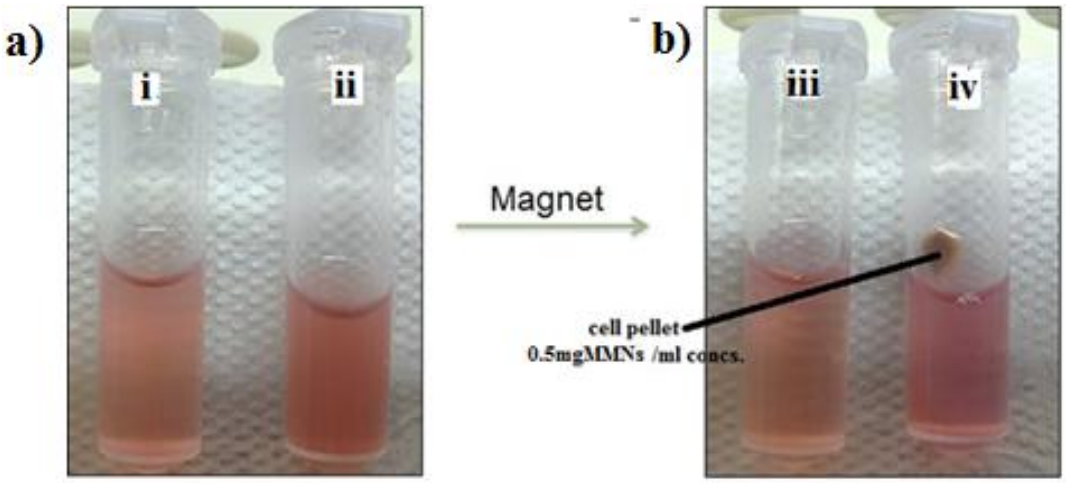


Fig S7. Uptake study of MMNs for *in-vitro* hyperthermia: (a-i) only DMEM media and (a-ii) HeLa cells treated with MMNs. Fig. (b-iii) and (b-iv) show the magnetic response of only DMEM and DMEM media with cell and MMNs, respectively. Fig. (b-iv) shows a brownish pellet indicating higher uptake of MMNs by HeLa cells.