ELECTRONIC SUPPLEMENTARY INFORMATION

Journal: New Journal of Chemistry

Studies on enhanced colloidal stability and heating ability of glycine functionalized LSMO nanoparticles for cancer hyperthermia therapy

Swati V. Jadhav a, Seung-Hwan Lee a, Dipali S. Nikam b, Raghvendra. A. Bohra b, Shivaji H. Pawar b, Yun-Sik Yu a, c *

a Convergence of IT Devices Institute, Dong-Eui University, Busan 47340, South Korea.
b Center for Interdisciplinary Research, D. Y. Patil University, Kolhapur 416006, MS, India.
c Department of Radiological Science, Dong-Eui University, Busan 614-714, South Korea.

* Corresponding Author’s Email address: ysyu@deu.ac.kr (Y. S. Yu)
Tel.: +82-51-590-2760/+82-10-3846-9295 Fax: +82-51-890-2767
Magnetic properties

Fig. S1 M-H curves of uncoated (U), glycine monolayer coated (G1) and glycine bilayer coated (G2) LSMO NPs measured at room temperature.

Fig. S1 shows typical (vibrating sample magnetometer) VSM magnetization hysteresis curve at room temperature for the synthesized MNPs. The loops aspect indicates the prepared NPs are superparamagnetic; with negligible coercivity (13.35, 11.05, 10.46 Oe) and negligible remanence (6.7, 5.4, 5.2 emu/g). This is attributed to the fact that the MNPs included in the polymer matrix were so small that they may be considered to have a single magnetic domain. The saturation magnetizations of the MNPs in the study are found to be 35.20, 31.35 and 29.14 emu/g for uncoated, monolayer and bilayer coated LSMO NPs respectively. Magnetization decreased with coating of glycine, this is because magnetization is proportional to the amount of weight for the same magnetic material. Organic coating (glycine) layers on magnetic material increases the amount of non-magnetic substance which reduces the overall magnetization of the material. Khot et al reported the reduction in magnetization for coated sample may be attributed to the presence of a non-magnetic
dextran coating layer onto the surface of NPs which reduces the particle–particle interaction and lowers the exchange coupling energy which in turn reduces the magnetization. [1] Shete et. al. reported the reduced magnetization in AP-coated MNPs could also result from the small particle surface effect which refers to the disordered alignment of surface atomic spins induced by reduced coordination and broken exchange between surface spins. This surface effect is more noteworthy in small particles as the ratio of surface atoms to the interior atoms increases with a decrease in particle size. [2] Patil et. al. indicated organic coating chitosan/glutaraldehyde layers on magnetic material increases the amount of non-magnetic substance which reduces the overall magnetization of the material [3].

References

