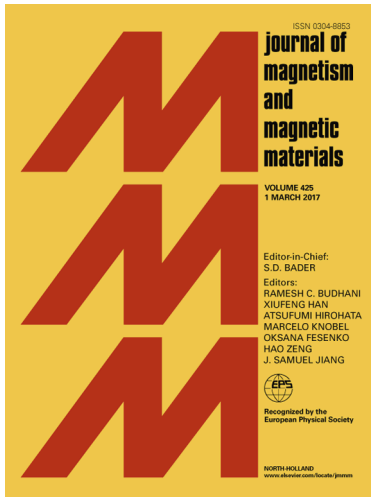

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Superparamagnetic Iron Oxide-Reduced Graphene Oxide Nanohybrid-a Vehicle for Targeted Drug Delivery and Hyperthermia Treatment of Cancer

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Abstract

In this work, an efficient superparamagnetic iron oxide-reduced graphene oxide (Fe_3O_4-RGO) nanohybrid has been synthesized following one-step co-precipitation method. The phase identification, microstructure and magnetic behaviour of nanohybrid were characterized by X-Ray diffraction, transmission electron microscopy (TEM), raman spectroscopy and vibrating sample magnetometer (VSM), respectively. TEM micrograph confirms the presence of well-segregated Fe_3O_4 nanoparticles in RGO layers. The layered RGO minimizes the agglomeration in Fe_3O_4 nanoparticles with slight reduction in magnetic behavior. Doxorubicin (DOX) has been used as a model drug to investigate the loading efficiency of nanohybrid and chemo-thermo therapeutic effect on human cervical cancer (HeLa cells). The DOX loaded nanohybrid (DOX-Fe_3O_4-RGO) shows maximum inhibition of human cervical cancer cell lines during magnetic field assisted hyperthermia treatment. The synergistic effect of nanohybrid demonstrated the potential for cancer cell proliferation prevention up to 90 % when treated at the concentration of 2 mg mL^{-1} for one million cells and exposed to AC field of 335 Oe at a fixed frequency of 265 kHz for 35 min.

Key words: DOX, Nanohybrid, RGO, HeLa, Hyperthermia, Fe_3O_4

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