absorption band as well as a larger reflection loss (Fig. 1B). As a result of co-
mm) exhibit enhanced microwave absorption properties including a wider
samples containing 20 wt% composites with different layer thickness (1.0~3.0
acting with the r-GO surface. Compared with pristine r-GO [1], all the test
test samples have been greatly enhanced in the range of 8~18 GHz.

[1] C. Wang, X. Han, P. Xu, et al. The electromagnetic property of chemically
reduced graphene oxide and its application as microwave absorbing mate-
Dikin, R. D. Piner, et al. Synthesis of graphene-based nanosheets via chemi-
Li, H. Cao, J. Shao, et al. Superparamagnetic Fe3O4 nanocrystals@graphene

FIG. 1(A) TEM image of hollow Fe3O4@r-GO composites, the inset is a SEM image of an
individual bowl-like Fe3O4 hollow sphere; (B) Reflection loss (Rf) of the composites with different sample layer thickness versus frequency in the range of 8-18 GHz.

DW-08. Investigation of magnetic properties of non-magnetic ion (Al, Ga, In) doped
Ba2Mg0.5Co1.5Fe12O22. J. Lim1, C. Kim1, B. Lee2 and C. Kim3. 1. Departments of
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The spinel ferrite nanoparticles of composition MFe2O4, where M is Co or Ni exhibit interesting magnetic properties that are potentially useful for a broad range of biomedical applications, especially in the field of magnetic resonance imaging. Changing the identity of M, and by changing the crystal- site size of the ferrites can systematically produce nanocrystals with diverse magnetic properties. Once the preparation of the nanoparticles has been optimized, the particles need to be coated with a biocompatible materi-
als to prevent aggregation, sedimentation and to provide a scaffold for further functionalization. In this work, spinel ferrites of composition CoFe2O4, NiFe2O4, and NiCo2O4 were synthesized by a polyol method utiliz-
ing ethylene glycol as the solvent, reducing agent, and surfactant. The nanoparticles produced were surface coated with 3-aminopropyltriethox-
silane to increase solubility as well as to serve as an anchor for further con-
jugation with targeting substrates such as peptides and antibodies. Varying the reaction time from thirty minutes to one hour produced crystallite sizes of 20 and 40 nm respectively, as measured by X-ray diffraction. Magnetic characterization by vibrating sample magnetometry shows saturation values that ranged from 34.2 to 71.2 emu/g. Magnetic resonance imaging (MRI) was carried out to measure the transverse relaxation time (T2) of the series of nanoparticles in order to investigate the size dependence and crystallite composition of the particles ability to affect the transverse relaxivity (r2). Further understanding of how ferrite composition and crystallite size effect their magnetic properties and resulting MRI contrast abilities will provide insight into the best materials for the next generation of contrast agents.

DW-10. RF Heating Characteristics of (NixCo1-x)yZnzFe2O4 Ferrite Nanoparticles. Z. Jago1, E. Rebrov2, Z. Turgut2 and G. Kozlowski1. 1. Physics, Wright State University, Dayton, OH; 2. AFRL, Wright Patterson AFB, Dayton, OH; 3. Chemical Engineering, Queen’s University, Belfast, United Kingdom

Colloidal ferrofluids, which are physical mixtures of magnetic nanoparticles (MNPs) suspended in a fluid medium, have shown to be viable candidates as efficient heat sources under an applied radio frequency (RF) magnetic field. The unique advantage of this approach is the ability to heat locally and con-
trol the rate of heat transfer by eliminating conductive and/or convective heat transport resistances. The later is of great importance in miniaturized reactors that are mainly used for heat and mass transfer limited reactions. The present work investigates RF heating characteristics of sol-gel processed ferromag-
netic (NixCo1-x)yZnzFe2O4 nanoparticles as heat sources for microreactors. Zinc substitutions and different calcination temperatures after sol-gel synthesis are employed to arrive at ferrite nanoparticles with different coercivity values and grain sizes. RF heating was accomplished through a 4-turn coil using a 1.0kW Ameritherm power supply with a variable frequency between 295-315kHz and maximum output of 100A. Table 1 summarizes magnetic properties, grain sizes and specific power loss values of the nanoparticles as a function of RF excitation current. Higher power losses are measured for nanoparticles that have lower coercivities. We discuss the effects of saturation magnetization, coercivity and grain size on the obtained power losses.