Abstract Submitted
for the BPNMC21 Meeting of
The American Physical Society

Tuning Properties of Super Paramagnetic Iron Oxide Nanoparticles by Microfluidics Approach S. LOPEZ, C.M. TREVINO DE LEO, Z. LAWERA, K. MARTIROSYAN, UTRGV Department of Physics and Astronomy — Microfluidic synthesis methods offer control of reaction parameters such as, concentrations of the reactants, pH, temperature, and flow rate. In the biomedical field nanomaterials have improved both diagnostic and therapeutic methods leading to the emergence of theranostic nanomedicine. Nanoparticle-based theranostics allow for the simultaneous treatment and imaging of effected tissue. Of interest are Super Paramagnetic Iron Oxide Nanoparticles (SPIONs), which are biocompatible and have the property, at less than 10 nm in diameter, of only being magnetized in the presence of an external magnetic field due to each SPION being a single-domain, having each their own magnetic moment. In the absence of a magnetic field, each SPION has zero-net magnetic coercivity and moment. Colloidal suspensions of SPIONs and protection from aggregation can be achieved via surface passivation with ligands. The coupling of SPIONS to nanomaterials such as Quantum Dots (QDs) has the capacity to offer greater specificity in both targeting and drug-delivery efforts. Due to their excellent photostability, broad absorption spectra, and tunable size and emission wavelength, QDs have applications as energy-efficient photovoltaics, quantum computing, and biomedical imaging. A problem presents itself with the elemental toxicity of first generation QDs consisting of the heavy metals Cd and Pb; however, through surface passivation and coupling with SPIONs, they may be made biocompatible via microfluidic synthesis methods.

Silverio Lopez
UTRGV Department of Physics and Astronomy

Date submitted: 25 Jan 2021 Electronic form version 1.4