

Abstract Submitted
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Magnetic stability of FeO/Fe₃N nanoparticles under ion irradiation JENNIFER ANAND SUNDARARAJAN, DONGTAO ZHANG, YOU QIANG, University of Idaho, WEILIN JIANG, EMSL, Pacific Northwest National Laboratory, NANO PHYSICS AND NANO MATERIALS RESEARCH GROUP TEAM¹, ENVIRONMENTAL AND MOLECULAR SCIENCES LABORATORY COLLABORATION² — Ion irradiation effects on the magnetic properties of FeO/Fe₃N (Iron oxide/Iron Nitride) nanoparticles are investigated in this study. The FeO/Fe₃N nanoparticles were prepared using a nanocluster deposition system in which pure iron nanoparticles were generated and allowed to react with oxygen and nitrogen gases and subsequently deposited onto a silicon wafer substrate. The XRD data confirms the presence of FeO and Fe₃N compounds in the particles. The saturation magnetization of these nanoparticles measured by VSM was found to be around 37.54 emu/g. The coercivity (87.9 Oe) and remanence (3.2 emu/g) of these particles remains unaltered after irradiation with 5.5 MeV Si²⁺ ions to a fluence of 1016 ions/cm² at room temperature, indicating that the magnetic properties of those nanoparticles are not affected even in a highly radioactive environment. The magnetic stability can provide us promising applications for advanced data storage.

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