Abstract Submitted for the MAR06 Meeting of The American Physical Society

Iron nanoparticles embedded in $SrTiO_3$ via ion implantation 1¹ P.V. WADEKAR, Q.Y. CHEN, X.M. WANG, H.W. SEO, O. LOZANO, D.H. KIM, Z.H. ZHANG, J.R. LIU, Y.Y. XUE, WEI-KAN CHU, Dept. of Physics & Texas Center for Superconductivity, University of Houston, Texas, USA. — Magnetic nanoparticles are interesting because of their possible applications ranging from biomedicine to data storage. Syntheses of iron nanoparticles embedded in YSZ and Al_2O_3 matrices by ion implantation have already been reported in literature. It is thus natural to ask if SrTiO₃ would be a good alternative matrix material because of its compatibility with silicon and the unique dielectric behaviors. In this work, 60 keV Fe^+ ions were implanted at room temperature into single-crystalline substrates of $SrTiO_3$ to a dosage of 5×10^{16} ions/cm². The specimens were then annealed at different temperatures in various ambient to bring about the nano-precipitation. Spectrophotometry, SQUID magnetometry, X-ray diffraction, electron microscopy, and electrical measurements were conducted to understand the magnetic and electrical properties in relation to the structures of the nano-composites formed under various conditions of ion implantation and post-annealing.

¹Supported by NSF grant DMR-0404542 and by DOE grant DE-FG02-05ER46208. Partial support by the Welch Foundation and the State of Texas through TcSUH are also acknowledged.

Quark Chen Dept. of Physics & Texas Center for Superconductivity, University of Houston, Texas, USA.

Date submitted: 07 Dec 2005

Electronic form version 1.4