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Switching behavior of Nb/Exchange spring magnet/Nb Josephson
Junctions fabricated by Nanosphere Lithography JIYEONG GU, GILBERT ARIAS, SAMUEL HEDGES, Dept. of Physics and Astronomy, California State University, Long Beach — Superconductor(S)/ferromagnet(F)/superconductor Josephson junction was fabricated by nanosphere lithography method. Samarium-Cobalt (SmCo)/Permalloy(Py) exchange spring magnet system was used to generate an inhomogeneous magnetic structure in Niobium(Nb)-based Josephson junctions. We introduced nanosphere lithography in our device fabrication in order to decrease the lateral size of junctions and improve the quality of our devices. A bigger size junctions (tens of microns) were fabricated by optical photolithography using a mask.* Materials were deposited through DC magnetron sputtering. Base structure of devices was patterned through photolithography. Modulations of the critical current and IV-curve characteristics of the junction were used to search for direct evidence of the odd-triplet component. In addition, to investigate the switching behavior of S/F/S junction for memory application junction critical current was measured as a function of magnetic field and the angle between an easy axis of ferromagnetic layer and the external magnetic field by rotating the sample under magnetic field. Magnetic switching behavior of the ferromagnetic layers in our junction was also characterized based on this observation. * Junction fabrication in this research by an optical photolithography using a mask was conducted at the Center for Nanophase Materials Sciences at Oak Ridge National Laboratory (CNMS User Project CNMS2014-257).

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