Abstract Submitted
for the PSF12 Meeting of
The American Physical Society

Fabrication of Nb/Al2O3/Nb Josephson Junctions using Atomic Layer Deposition RONGTAO LU, ALAN ELLIOT, LOGAN WILLE, BO MAO, SIYUAN HAN, JUDY WU, University of Kansas Dept. of Physics & Astronomy, JOHN TALVACCHIO, HEIDI SCHULZE, RUPERT DAVIS, DANIEL EWING, Northrop Grumman, Baltimore, MD, H.F. YU, G.M. XUE, S.P. ZHAO, Bejing National Laboratory for Condensed Matter Physics, Chinese Academy of Sciences
— Atomic layer deposition (ALD) provides a promising approach for deposition of ultrathin low-defect-density tunnel barriers, and it has been implemented in a high-vacuum magnetron sputtering system for *in situ* deposition of ALD-Al_2O_3 tunnel barriers in superconductor-insulator-superconductor (SIS) Josephson junctions. A smooth ALD-Al_2O_3 barrier layer was grown on a Al-wetted Nb bottom electrode and was followed with a top Nb electrode growth using sputtering. The formation of tunnel barriers in these Nb/ALD-Al_2O_3/Nb trilayers was strongly indicated at room temperature by using the current-in-plane tunneling technique. Preliminary low temperature measurements of current-voltage characteristics (IVC) of the Josephson junctions made from these trilayers confirmed the integrity of the ALD-Al_2O_3 barrier layer. However, the I_cR_N product of the junctions is much smaller than the value expected from the Ambegaokar-Baratoff formula suggesting a significant pair-breaking mechanism at the interfaces.

Rongtao Lu
University of Kansas Dept. of Physics & Astronomy

Date submitted: 22 Oct 2012 Electronic form version 1.4