

Abstract Submitted
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Study of Effects of Scratch and Shadow Defects on Superconducting Niobium Thin films¹ DAVID MYERS, PHILLIP BROUSSARD, Covenant College — Using niobium thin films approximately 47 nm thick made by magnetron sputtering, we attempted to produce a superconducting sample exhibiting Josephson junction behavior. We began by studying resistance vs. temperature plots of unpatterned niobium thin film samples without defects in order to characterize the films that our deposition techniques were producing. We then studied patterned samples that consisted of narrow bridges between 200 μm and 400 μm wide and between 3 mm and 5 mm long. We measured resistance vs. temperature and voltage vs. current traces on patterned samples both with and without defects and with and without an applied magnetic field. The defects were produced on some samples by lightly scratching the Si substrates before deposition, and on other samples by using a thin wire to shadow the substrate during deposition. We were able to produce multiple scratched samples that had voltage vs. current traces characterized by a voltage jump, and one sample that exhibited clear hysteresis below a reduced temperature ($t=T/T_c$) of 0.9.

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