Characterization of Thin Films for Quantum Information Science

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Thin films play a vital role in the development of technologies such as spintronics, low-power-loss electronics, and quantum computing. We characterized thin films to study their unique properties, such as aluminum (Al) and bismuth antimony (BiSb) thin films. BiSb thin films have been characterized using scanning tunneling microscopy (STM); images show nanoscale structures such as triangles, bright interconnected loops, steps, and smooth surfaces, indicating a high-quality film, similar to Bi thin films [1]. Al thin films capped with silicon have been characterized using the physical properties measurement system (PPMS) to measure the critical temperature (Tc) of superconductivity, and results indicate an enhancement of superconductivity compared to the Tc of bulk aluminum, similar to uncapped Al thin films [2]. Properties of BiSb and Al thin films have been obtained using techniques such as STM and PPMS; characterizing thin films is important to study their effects and harness their properties for potential future technologies. This work is supported by NSF DMR 233941 and NSF PREM grant DMR-2423992.

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