

Abstract Submitted
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Dependence of superconducting properties of NbN thin films on sputtering parameters.¹ TRUPTI KHAIRE, FAUSTIN CARTER, JUNJIA DING, CHRYSTIAN POSADA, AMY BENDER, GENSHENG WANG, VOLODYMYR YEFREMENKO, JOHN PEARSON, Argonne National Laboratory, STEVE PADIN, University of Chicago, CLARENCE CHANG, AXEL HOFFMANN, VALENTYN NOVOSAD, Argonne National Laboratory, SPT3G COLLABORATION — Recently, there has been growing interest in utilizing NbN, TiN, NbTiN thin films in superconducting device applications (e.g. detectors for CMB, mm and sub-mm astronomy). In this work, we have fabricated NbN superconducting thin films by DC reactive magnetron sputtering of Nb in the presence of argon and nitrogen gases. We found that the critical temperature of NbN films is sensitive to various deposition parameters like nitrogen flow rate, target voltage, base pressure, RF substrate bias, and the substrate temperature. By studying each of these factors we have been able to create highly reproducible NbN thin films. We obtained a T_c of 15.25 ± 0.25 K for 300 nm thick NbN film grown on silicon substrate at modest temperature of 250 C in the presence of RF substrate bias. We are also investigating the microwave properties of these NbN films at temperatures well below 50 mK by fabricating quarter wavelength CPW resonators out of NbN and characterizing their frequency shifts and quality factors as functions of temperature and power. In this work we present the results of these analyses.

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