

226. Title: Suppression of superconductivity in epitaxial NbN ultrathin films

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Abstract: This paper studies the suppression of superconducting transition temperature ( $T_c$ ) of ultrathin NbN film. We fabricated epitaxial NbN superconducting thin films of thicknesses ranging from 2.5 to 100 nm on single crystal MgO (100) substrates by dc magnetron sputtering. We performed structure analyses and measured their electric and far infrared properties. The experimental results were compared with several mechanisms of the suppression of superconductivity proposed in the literature, including the weak localization effect, the proximity effect, and quantum size effect (electron wave leakage model). We found that the electron wave leakage model matches best to the experimental data.