

Abstract Submitted  
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**Microwave loss of novel epitaxial superconductor-insulator-superconductor (SIS) trilayers** U. PATEL, Department of Physics, University of Wisconsin, Madison, Wisconsin 53706, USA, K.H. CHO, Department of Materials Science and Engineering, University of Wisconsin, Madison, Wisconsin 53706, USA, L. MAURER, S. SENDELBACH, D. HOVER, Department of Physics, University of Wisconsin, Madison, Wisconsin 53706, USA, C.B. EOM, Department of Materials Science and Engineering, University of Wisconsin, Madison, Wisconsin 53706, USA, R. MCDERMOTT, Department of Physics, University of Wisconsin, Madison, Wisconsin 53706, USA — The performance of superconducting phase qubits is currently limited by spurious coupling of the qubit to two-level state (TLS) defects in the amorphous dielectric materials of the circuits. Thus, it is highly desirable to develop defect free epitaxial dielectric materials for improved junction barriers and capacitor dielectrics. We have characterized the dielectric loss of several candidate SIS trilayers including Re/MgO/Al and Re/LaAlO<sub>3</sub>/Al grown on c-sapphire substrates. We describe our multiplexed microstrip resonator device layout and present data on the intrinsic quality factors of the MBE-grown dielectrics.

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