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Superconducting Titanium Nitride Coplanar Resonators: Relationships between performance and deposition parameters[1] B. CHIARO, S. OHYA, A. MEGRANT, C. NEILL, R. BARENDS, B. CAMPBELL, Y. CHEN, J. KELLY, M. MARIANTONI, J. MUTUS, P. O'MALLEY, P. ROUSHAN, D. SANK, A. VAINSENCHER, J. WENNER, T. WHITE, C.J. PALMSTROM, B.A. MAZIN, A.N. CLELAND, J.M. MARTINIS, UC Santa Barbara — Superconducting coplanar waveguide (CPW) resonators are widely used structures in the fields of photon detection and quantum information processing. Recently, there has been a growing interest in titanium nitride (TiN) thin films due to their widely tunable critical temperature, large surface inductance, and ability to produce high intrinsic quality factor (Q_i) resonators. We have deposited nearly stoichiometric TiN films on Si substrates by reactive magnetron sputtering. By increasing the deposition pressure and adjusting the N2 flow rate to maintain stoichiometry, the film stress was changed from $\sim$ 100 MPa to $>$ 3000 MPa and the Q_i of CPW resonators made from these films increased from $\sim 10^4$ to $\sim 10^6$ for single photon excitations measured at $\sim$ 100 mK. In this talk, we discuss relationships between deposition parameters, film properties, and microwave electrodynamic responses in these resonators.

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