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High Quality Factor MBE-grown Aluminum on Silicon Planar Resonators[1] ANTHONY MEGRANT, Z. CHEN, B. CHIARO, A. DUNSWORTH, C. QUINTANA, B. CAMPBELL, UC Santa Barbara, R. BARENDS, Y. CHEN, A. FOWLER, Google, Santa Barbara, I.-C. HOI, UC Santa Barbara, E. JEFFREY, Google, Santa Barbara, J. KELLY, UC Santa Barbara, J. MUTUS, Google, Santa Barbara, C. NEILL, P.J.J. O'MALLEY, UC Santa Barbara, P. ROUSHAN, D. SANK, Google, Santa Barbara, A. VAINSENCHER, J. WENNER, T. WHITE, C. PALMSTROM, UC Santa Barbara, J.M. MARTINIS, University of California and Google, Santa Barbara, A.N. CLELAND, UC Santa Barbara — Linear arrays of planer Xmon qubit circuits fabricated using thin aluminum films on sapphire substrates have resulted in long coherence times and high fidelity gates. Scaling up to larger circuits, including two-dimensional qubit arrays, may however benefit from building circuits on silicon instead of sapphire substrates. I will present recent tests in this direction, reporting on measurements of superconducting coplanar waveguide resonators fabricated using aluminum films deposited on silicon in a molecular beam epitaxy (MBE) system. These resonators exhibit exceptional performance, with quality factors at low temperatures and single photon excitation energies exceeding $5x10^6$.

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