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Coherence in a transmon qubit with epitaxial tunnel junctions MARTIN WEIDES, JEFFREY KLINE, MICHAEL VISSERS, MARTIN SANDBERG, National Institute of Standards and Technology, DAVID WISBEY, Saint Louis University, DAVID PAPPAS, National Institute of Standards and Technology, BLAKE JOHNSON, TOM OHKI, Raytheon BBN Technologies — We developed transmon qubits based on epitaxial tunnel junctions and interdigitated capacitors. This multileveled qubit, patterned by use of all-optical lithography, is a step towards scalable qubits with a high integration density. The relaxation time T_1 is $.72 - .86$ μsec and the ensemble dephasing time T_2^* is slightly larger than T_1. The dephasing time T_2 (1.36 μsec) is nearly energy-relaxation-limited. Qubit spectroscopy yields weaker level splitting than observed in qubits with amorphous barriers in equivalent-size junctions. The qubit's inferred microwave loss closely matches the weighted losses of the individual elements (junction, wiring dielectric, and interdigitated capacitor), determined by independent resonator measurements.

[X] Prefer Oral Session
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