

Abstract Submitted
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Superconducting microwave resonators - low loss, tunability, and coupling HAOHUA WANG, RADOSLAW C. BIALCZAK, MIKE LENANDER, ERIK LUCERO, MATTEO MARIANTONI, MATTHEW NEELEY, AARON O'CONNELL, DANIEL SANK, MARTIN WEIDES, JAMES WENNER, TSUYOSHI YAMAMOTO¹, YI YIN, ANDREW CLELAND, JOHN MARTINIS, University of California, Santa Barbara — The superconducting microwave resonator is an important device for applications such as quantum computation and photon detection. A key parameter characterizing its performance is the energy decay time. We have optimized our superconducting coplanar resonators to achieve an energy decay time around 10 μ s. By fabricating devices with different metals and measuring their quality factors as a function of temperature, power, and cooling field, we have identified an important dissipation mechanism: loss from two-level states at metal-oxide surfaces. We also find that the (classical) measurement of the quality factor at low power is consistent with the energy decay time measured in a (quantum) qubit-resonator swap experiment. Further experiments on tuning the resonator frequency while minimizing dissipation, as well as coupling two resonators, will also be discussed.

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