

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Fabrication of Josephson Junction without shadow evaporation

XIAN WU, HSIANGSHENG KU, National Institute of Standards and Technology, JUNLING LONG, University of Colorado Boulder, DAVID PAPPAS, National Institute of Standards and Technology — We developed a new method of fabricating Josephson Junction (Al/AlO_x/Al) without shadow evaporation. Statistics from room temperature junction resistance and measurement of qubits are presented. Unlike the traditional “Dolan Bridge” technique, this method requires two individual lithographies and straight evaporations of Al. Argon RF plasma is used to remove native AlO_x after the first evaporation, followed by oxidation and second Al evaporation. Junction resistance measured at room temperature shows linear dependence on P_{ox} (oxidation pressure), $\sqrt{t_{ox}}$ (oxidation time), and inverse proportional to junction area. We have seen 100% yield of qubits made with this method. This method is promising because it eliminates angle dependence during Junction fabrication, facilitates large scale qubits fabrication.

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Date submitted: 10 Nov 2016

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