



Fabrication and characterization of air-bridges for low temperature microwave circuits

Motivation:

One of the most promising pathways towards implementing quantum computers is the use of superconducting microwave circuits. Proper grounding in such circuits is essential to avoid unwanted parasitic modes that lead to loss and decoherence. In addition, with increased complexity of the circuits used for multi-qubit access, advancing to three-dimensional layouts seems unavoidable. Air bridges are among the key components to realize the aforementioned goals in microwave circuits.

Project description:

The first part of this master's thesis project involves process development for fabricating the air bridges. As indicated above, some air bridges must connect the ground planes of coplanar waveguides (CPW) transmission lines. Others would act as transmission line crossovers that pass over other planar lines. It is essential for the fabrication process to be reliable and reproducible with high yield. Characterization and accurate documentation after each process is of great importance. The fabricated structures must next be characterized in terms of fabrication yield, DC properties (connectivity), and AC response (characteristic impedance, loss ...). As a part of the project, the student is required to design the measurement setup as well.

By working at state of the art cleanroom and laboratories, the student will be familiar with fabrication and characterization methods that are useful for pursuing opportunities in both academia and industry.

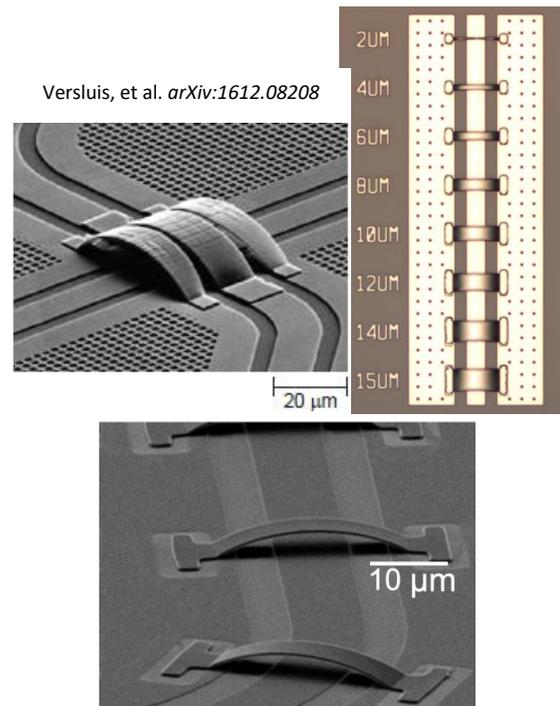
More information on quantum computing is available at <http://www.chalmers.se/en/centres/wacqt/Pages/default.aspx>

Prerequisites:

- Course in micro/ nanofabrication
- Course in electromagnetics
- Course or interest in superconductivity, and hands-on experience in microfabrication are not required, but are considered assets.

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Versluis, et al. *arXiv:1612.08208*

Chen, et al., *Appl. Phys. Lett.* 104, 052602 (2014)