Postdoctoral Position Available:

**Atomic Layer Deposition (ALD) Processing and In-Situ Analysis for Advanced Devices**

Postdoctoral candidates are sought for a new research program funded by a major award from I-ARPA through the U.S. Army Research Office, aimed at understanding and optimizing Josephson junction devices as qubit elements for quantum computing.

Building on his background in chemical and integrated processes for electronic materials and devices, Prof. Rubloff has built a major program in atomic layer deposition (ALD), a highly controlled materials deposition/synthesis approach with unprecedented thickness control at the atomic scale. His group has available substantial equipment, including three ALD systems, and has already applied it successfully to nanostructures for electrical energy storage (Nature Nanotechnology 2009). This level of perfection is attractive for creating Josephson junctions with very high quality dielectrics made by ALD, with hope to advance the quality of devices available for quantum computing applications.

This research will investigate in-situ synthesis of Josephson junction layer structures, e.g. Al-$\text{Al}_2\text{O}_3$-Al, fabricating entirely in ultrahigh vacuum (UHV) conditions with both ALD and thermally grown $\text{Al}_2\text{O}_3$ dielectrics and using thermal evaporation and/or MBE for in-situ Al deposition. A new, dedicated ALD system will be integrated with a substantial existing XPS/surface analysis system to carry out the studies, exploring the comparison between ALD and thermal dielectrics as well as interface and controlled contamination studies.

The work is a collaboration with groups expert in low temperature quantum phenomena and devices (Prof. Chris Lobb, UM physics) and with theorists Prof. Galitski (UM physics) and Musgrave (U.Colo. chem/bio engineering), as well as researchers from the Laboratory for Physical Sciences at UM.

**Position description and requirements:** The candidate will work in Prof. Rubloff’s group to pursue ALD and thermal processes carried out under ultraclean conditions, as well as in-situ surface analysis at various stages of forming the Josephson layer structures. Accordingly the candidate should have familiarity with UHV vacuum and surface analysis techniques, preferably with interest and experience in materials processing, as well as PhD and possibly postdoctoral experience.

**Career benefits:** This position presents significant scientific opportunity for pioneering work in advanced materials and devices for quantum computing and an array of very advanced devices. Given the high commitment of the electronics and other industries to ALD and Prof. Rubloff’s close links to these industries, the position is an attractive means for career migration into new but more established technological directions.

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