PhD Openings in the Labram Group at Oregon State University

The Labram Group in the School of Electrical Engineering and Computer Science (EECS) at Oregon State University is looking to hire a full-time PhD students starting September 2019. You will be fully-funded by the Labram Group, and will work on experimental projects in the development of next-generation flexible electronics. Candidates must have received an undergraduate degree in electrical engineering, materials science, physics, or a related discipline by 16th September 2019. Interested candidates should email a full CV / resume to John Labram at: john.labram@oregonstate.edu, by 31st January 2019. Informal inquiries can be made via the same email address.

Oregon State University is located in Corvallis, in the beautiful Pacific-Northwest of the United States. Further information can be found below:

- The Labram Group: http://web.engr.oregonstate.edu/~labramj/.
- Oregon State University: http://oregonstate.edu/.
- Information about Corvallis: https://visitcorvallis.com/.

Project 1: Quantum Devices Based on Disordered Metal Oxide Semiconductors

Low-cost, large-area, semiconductors represent a bold vision of the future in which electronics is omnipresent. This vision includes conformal, stretchable, transparent and bio-compatible electronics embedded into our natural surroundings, present whenever needed and enabled by simple and effortless interactions. If one were able to print circuits, at a comparable cost to printing a newspaper, then it is conceivable that transforming normal objects into smart-objects would be as routine as affixing a sticker.

In this project you will be developing devices based on ultra-thin (<10nm) layers of disordered metal oxide semiconductors. Despite traveling in disordered systems, charge carriers in metal oxide semiconductors have been shown to possess quantized energy states when confined to 2-dimensions. By studying and exploiting this phenomenon, you will be developing new and novel electronic devices, with a range of previously unobserved capabilities.

Project 2: Charge Transport in Curved Electronics

The future of electronics will be defined by a diversification in its physical form, enabling devices to be cheap and ubiquitous. While new electronic materials compatible with low-cost manufacturing techniques (such as printing) have been intensely studied, the mathematical framework for analysis of circuits remains identical to that of traditional, planar, silicon-based electronics, in which charge always travel in straight lines. Flexible, printed electronics necessitates a generalization of device models that incorporate non-planar and non-static pathways for electronic charge.

This project involves the derivation and experimental verification of a mathematical framework to reliably predict and understand the behavior of electronic devices in various non-planar geometries and under various deformations. By elucidating the nature and extent of deviations from ideal behavior, you will be able to make statements about the reliability of thin-film electronic devices with various unique physical form factors. Understanding these reliability issues will inform as to whether more complex device architectures (e.g. multiple gate TFTs) or compensation circuits are necessary for commercialization. As is the case for traditional silicon-based technology, an exhaustive understanding of device behavior is mandatory for commercial flexible electronics to be possible.