University of Glasgow | Department of Physics & Astronomy

Research Assistant/Associate in TEM of Advanced Oxide Devices

Reference Number	00093-6
Department/Faculty	407 Physics and Astronomy / Faculty of Physical Sciences
Job Family	Research & Teaching
Position Type	Full Time (Initial Funding for 4 years)
Salary Range	£25, 751 - £28,983/£31,671 - £35,646 (grade 6/7)
Closing Date	23 April 2010
Further Information	http://www.glasgow.ac.uk/jobs
Informal Contact	Dr. D. MacLaren, d.maclaren@physics.gla.ac.uk

Job Purpose

To undertake, present and publish leading research in magnetic and oxide materials using transmission electron microscopy and related techniques. The post is funded through "IFOX: Integrating Oxides" which is a new 7th Framework Programme funded by the European Community and including 17 international partners that span academic institutions and the major corporations IBM, Intel and Fiat. There is substantial scope for research development and international collaboration.

"IFOX: Interfacing Oxides" Project

IFOX is funded through the European Commission's 7th Framework Programme as a large-scale integrating project. It includes 9 academic partners across Europe; 3 research organizations; 2 SMEs and 3 multinational industrial partners. It is co-ordinated by Professor Theo Rasing (Radboud University, Nijmegen). The goal of IFOX is to explore, create and control novel electronic and magnetic unctionalities, with a focus on interfaces, in complex transition metal oxide heterostructures. It will develop the material platform for novel 'More than Moore' (MtM) and 'beyond CMOS' electronics that can be integrated into VLSI processes and have performance and functionality far beyond the state-of-the art. To this end it will achieve the following.

- Establish a theoretical basis to identify the most promising materials/heterostructures and to understand the new functionalities relevant for electronic applications.
- Grow oxide films on commercial substrates with a quality comparable to state-of-the-art semiconductor growth.
- Establish their patterning and processing conditions within the boundary conditions of current fabrication technologies.
- Characterize their structural, electronic and magnetic properties to deliver concepts for novel charge and/or spin based devices in the areas of memories, logic and sensor applications.

Investigations include ferroelectric and ferromagnetic oxides as well as artificial multiferroic heterostructures (deposited on large area silicon substrates). Final deliverables include viable design concepts for multifunctional magneto-electronics devices that are controlled by electric and magnetic fields and, ultimately, by ultra short light pulses.
The consortium are world leaders in the areas of theory, oxide deposition, lithography, device fabrication, and various characterization techniques will allow full control of all interface properties dominating the physical behaviour of oxide nano- and heterostructures. The goals of IFOX are driven by the needs of two large multinational semiconductor manufacturers (IBM and Intel) searching for 'beyond CMOS' technologies and by one large automotive company (FIAT) seeking to use oxides in electronic sensors for MtM and automotive applications. It is further supported by two SMEs with expertise and infrastructure for epitaxial oxide growth on Si with the goal to transfer academic knowledge to industry.

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The University of Glasgow's role in IFOX

The Glasgow Solid State Physics Group has been involved in understanding and developing advanced materials for over 30 years. At present we have 9 academic staff and research fellows, 4 postdoctoral researchers, 10 research students and 5 support staff. We study a wide range of materials and enjoy an international reputation in the areas of magnetic materials, semiconductors and ferroelectrics, all studied using electron microscopy and associated techniques. Our research is underpinned by instrumentation development and excellent collaborative links with both academic and industrial partners worldwide.

Our contributions to IFOX are as follows:

- Lorentz TEM imaging of multilayers and prototypical devices to provide direct visualisation of in-situ magnetic behaviour and quantitative induction maps with a resolution of ≤10nm;
- analysis of the impact of interface perfection and defect density on magnetic and ferroelectric characteristics;
- in-situ study of materials during application of electric currents
- Analytical electron microscopy of a range of plan view and cross-section samples with a view to correlating physical and interfacial structures with magnetic properties. Samples will include oxides, multiferroics and tunnel junctions.
- Focused Ion Beam milling and patterning of TEM samples.

Please see http://www.glasgow.ac.uk/jobs for a full job description and details of the application process.