

# SEMINAR

## Coherent Diffraction Studies of Medium – Range Order in Amorphous Materials

### – Current State and Future Promise

**J. Murray Gibson,**  
**Department of Physics**  
**Northeastern University, Boston, USA**

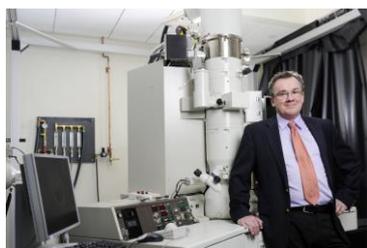
**Tuesday 19 January**

**11.00am – 12.00pm**

Science Lecture Theatre S9, Building 25  
16 Rainforest Walk, Monash University

### Abstract and Bio

Coherent diffraction techniques promise to expose subtle ordering in amorphous materials. This “medium-range-order” can be very important to understand and control the properties of amorphous materials. Beginning with early work on Fluctuation Electron Microscopy, a variety of innovative techniques have been developed by several groups. I will review the current state of fluctuation microscopy, especially as it reveals the structure of amorphous silicon, describe some recent measurements and modeling, and discuss future approaches to resolve controversy over the degree of paracrystallinity that is present in this material. I will also briefly discuss future directions for the technique applied to other materials.



*Born and raised in Scotland, Dr. J. Murray Gibson has held a range of senior academic and research positions. Most recently, he was the Director of the \$1.7 billion Advanced Photon Source (APS) at Argonne National Laboratory. Under his direction, APS emerged as the most productive source of protein structures in the world, became the global leader in X-ray studies of materials under extreme conditions, and attained the largest number of users of any scientific facility in the USA. Gibson earned his BSc in natural philosophy at the University of Aberdeen, Scotland, and his PhD in physics from the University of Cambridge,*

*England. He emigrated to the United States in 1978, beginning a fellowship at IBM Research, followed by 11 years at AT&T Bell Laboratories in Murray Hill, New Jersey. At Bell Labs, Gibson pioneered the use of advanced electron microscopy techniques to understand the structure/property relationships of semiconductor nanostructures. He built the first instrument that visualized in-situ—at atomic resolution—the growth of thin films by molecular beam epitaxy. Among several patents, he co-invented a novel approach to semiconductor lithography that led to the development of a spin-off company. Gibson joined the University of Illinois in 1991, and trained 15 PhD students before joining Argonne in 1999 as the Director of its Materials Science Division. He has published almost 200 journal articles and is a fellow of the American Physical Society and the Royal Microscopical Society. He was elected the 2011 Chair of the Physics Section of the American Association for the Advancement of Sciences, where he was also elected a fellow. He serves as a member of the board of directors of the Materials Research Society.*

Convenor: Professor Joanne Etheridge

Email: [mcem@monash.edu](mailto:mcem@monash.edu)

Tel: 9905 5563

Visitors are most welcome: Please note that there are designated Visitors Car Parks clearly ground-marked by white paint and tickets, at a cost of \$11.10 for up to 3 hours, available from a dispensing machine. Please refer to the Clayton Campus Map at the following link for the various carparking facilities. <http://www.monash.edu.au/campuses/clayton/>