The 4th APDIC World Round-Robin Seminar

For any organisation to flourish, it is vital that there is an influx of new blood, young people who can take over from the ageing members of that organisation. This can of course be applied to any group or body or even a scientific discipline, and the field of phase diagram and thermodynamics research is no exception. Further, it is also vital that new people are fully trained, which, in the case of a scientific discipline such as ours, underlines the importance of strong basic teaching at the University level. But, over recent years, and mainly because of pressure on courses on materials to become more diversified, there is a feeling that the more traditional basic subjects have received reduced importance in teaching programmes. This has led to a general reduction in expertise in younger scientists, which is self-perpetuating. This is something that has been the concern of the *Materials Chemistry Committee* (MCC) of the *Institute of Materials Minerals and Mining* (IOM3) in the UK for a number of years.

The *Alloy Phase Diagram Commission* (APDIC) was formed in 1986 in Orlando, Florida, USA and comprises 17 member organisations from all over the globe, who are engaged in phase diagram and thermodynamics research. APDIC's mission is to attempt to coordinate

research effort and exchange information on phase diagram evaluation and to promote industrial and academic application. As well as the involvement with research, APDIC has inaugurated the *World Round-Robin Seminar* series. This is a series of educational seminars on phase diagrams for students and those in industry who do not have an appreciation of the subject. Seminar lecturers are usually selected from the APDIC membership or are nominated by APDIC members; they are all well-known experts in their respective fields.

Each seminar is hosted by a local APDIC member, and the format of the event is entirely the responsibility of the organiser. To date, four such seminars have been held: Hokkaido University, Sapporo, Japan in 2003; Rio de Janeiro, Brazil in 2006; Universite Montpellier 2, Montpellier, France in 2010; and at the Institute of Materials Minerals and Mining (IOM3), London, UK in June, 2012.

The Materials Chemistry Committee of the IOM3 services the needs of primarily UK's materials scientists who have an interest in materials chemistry, phase diagrams and thermodynamics. For some years, the MCC has been concerned by the decline in the expertise in the understanding of phase diagrams and thermodynamics and a lack of appreciation of what can be achieved by the application of some of the techniques that are now available. As part of an ongoing campaign to address this issue, the MCC representing the IOM3 (who is the APDIC member) held the 4th APDIC World Round-robin Seminar at the Institute's headquarters in central London.

Only a single day was made available for the meeting. This required a tightly focussed and intense programme in order for the participants to gain full benefit from the day. But, it was also important that the meeting was balanced and had breadth, and therefore the meeting was split into two distinct sessions. The morning session covered fundamental aspects, from the basics of phase diagram construction, through experimental techniques and *Calphad* modelling, to *ab initio* and CVM calculations. Lectures were provided by APDIC members, all experts in their respective fields (one external lecturer was invited). The afternoon session was dedicated to applications so that the meeting delegates could see how the techniques discussed in the morning session could be applied to real-life problems in industry. Speakers were invited from a variety of industries to demonstrate how phase diagrams and thermodynamics help with regard to materials development and processing.

The meeting was a tremendous success, with the attendance of around 40 delegates and speakers. Judging by the popularity of the meeting, there is clearly a need for this type of event, certainly in the UK. So much so, the MCC is considering holding similar meetings in future, possibly to be repeated on a biannual basis.

A majority of the meeting delegates were younger scientists, which bodes well for the future, and APDIC's initiative of introducing the WRRS series has created an excellent vehicle to stimulate the dissemination of knowledge and to encourage younger scientists to take an active interest in the subject.

More details of this particular meeting can be found on the IOM3 website (<http://www.iom3.org/content/materials-chemistry-science-resources>)

4th APDIC WRRS Programme

Morning Session

Fundamentals

1. **Introduction**
Prof. Tetsuo Mohri (Hokkaido University, Japan—*chair APDIC WRRS committee*)
2. **How to Read & Apply Phase Diagrams**
Prof. Rainer Schmid-Fetzer (Clausthal University of Technology, Germany—IOM3 Hume-Rothery prize winner, 2010)
3. **Experimental methods**
Dr. Andy Watson (University of Leeds, UK—*chair IOM3-MCC*)
4. **From *ab initio* to CALPHAD modelling**
Prof. Catherine Colinet (INPG, Grenoble, France)
5. **Calculation of phase equilibria from critically assessed thermodynamic data**
Dr. Alan Dinsdale—(NPL, UK—IOM3 Hume-Rothery prize winner, 2000)
6. **CVM methods**
Prof. Tetsuo Mohri (Hokkaido University, Japan—*chair APDIC WRRS committee*)

Afternoon Session

Applications

1. **Thermodynamics and Phase Diagrams for Lithium-ion Batteries**
Prof. Hans Seifert (K.I.T., Karlsruhe, Germany)
2. **Materials for aero engines**
Mr. Colin Small, (Rolls Royce PLC, UK)
3. **Applications of Phase Equilibria in Aluminium Alloy Products and Processes**
Dr. Paul Evans, (Technology Strategy Consultants, Warwick, UK)
4. **Phase Equilibria: Materials for Nuclear Fission Energy Systems**
Prof. Rudy Konings (European Commission, Joint Research Centre, Institute for Transuranium Elements, Karlsruhe, Germany)
5. **Cement chemistry**
Prof. Fred Glasser FRSE FIMM (University of Aberdeen, UK—IOM3 Hume-Rothery prize winner, 2011)

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