

History of the AGH-FZJ co-operation

H Nickel, P J Ennis, A Czyrska-Filemonowicz

Our initial co-operation started back in 1978 (to be exact, on 11.01.1978), when Professor Nickel, at that time director of the Institute for Reactor Materials, Nuclear Research Centre Jülich (IRW-KFA), visited for the first time Kraków and the Faculty of Metallurgy and Materials Science of the Academy of Mining and Metallurgy (Prof Gorczyca and Dr Czyrska-Filemonowicz). Since then many contacts have been established between scientists from the group working on mechanical properties of materials in IRW-KFA and the transmission electron microscopy group of the Faculty of Metallurgy and Material Science in AGH University, from which the idea for a joint Polish-German programme arose. In the early nineties an official co-operation on correlation between microstructure and mechanical properties of high temperature alloys began and has resulted in more than 140 joint publications and conference contributions. In addition, three joint PhD theses were supervised by Prof Schubert (FZJ) and Prof Czyrska-Filemonowicz (AGH).

At about the same time, scientific contacts between the corrosion team of Professor Mrowec from the Faculty of Materials Science and Ceramics of the AGH and the group of Dr Schuster from KFA began in 1981, when both scientists met during the 8th International Congress on Metallic Corrosion (ICMC) in Mainz/Germany. In 1984 at the 9th ICMC in Toronto, Canada, Prof Mrowec and Dr Schuster met again and decided to organise a Polish-German workshop on high temperature corrosion, bringing together leading corrosion scientists in the two countries. Three Polish-German workshops on high temperature corrosion and mechanical properties took place. This co-operation has developed over the years and resulted in about 70 papers and two joint PhD theses supervised by Prof Singheiser, Dr Quadackers (FZJ) and Prof Gil (AGH).

The important events in the history of the co-operation between FZ Jülich and AGH Kraków are listed below.

- **1978** First visit of Prof Nickel to Kraków. Discussions with Prof Gorczyca and Dr Czyrska-Filemonowicz (AGH)
- **1981** Initial discussions on metallic corrosion between Prof Mrowec and Dr Schuster at the 8th International Congress on Metallic Corrosion (ICMC)
- **1984** Further talks between Prof Mrowec and Dr Schuster at the 9th ICMC in Toronto
- **1985** 1st Polish-German Seminar on Properties of High Temperature Alloys, 3-5 July, AGH Kraków
- **1987** 2nd German-Polish Workshop on High Temperature Corrosion in Metals, 2-4 December, KFA Jülich
- **1988** Specialist Meeting on High Temperature Materials for Gas-cooled Reactors, 20 June, Kraków

- **1990** 3rd Polish-German Corrosion Workshop, 10-15 July, Kraków-Mogilany
- **1994** 75th anniversary of the University of Mining and Metallurgy and award of Doctor honoris causa for Prof Gorczyca, 20 June, AGH Kraków
- **2000** Symposium "40 years of electron microscopy in AGH" for 75th birthday of Prof. S. Gorczyca, 22-23 June, AGH Kraków
(invited lectures: H Schuster, K Urban)

Many scientists from FZJ have attended conferences and summer schools in Poland, which were organized (or co-organized) by the AGH, and presented invited lectures:

- **1995** XIV International Conference Advanced Materials and Technologies, 17-21.05.1995, Zakopane (invited lecture: P J Ennis)
- **1996** IX International Conference on Electron Microscopy of Solids, 6-9.05.1996, Zakopane (invited lectures: P J Ennis, H J Penkalla, E Wallura, K Urban)
- **1998** XV International Conference Advanced Materials and Technologies, 17-21.05.1998, Zakopane (invited lecture: H J Penkalla)
- **1999** X International Conference on Electron Microscopy of Solids, 20-23.09.1999, Warszawa (invited lecture: H J Penkalla)
- **2001** XVI International Conference Advanced Materials and Technologies, 16-20.09.2001, Gdansk-Jurata (invited lectures: P J Ennis, L Singheiser, K Urban)
- **2002** XI International Conference on Electron Microscopy of Solids, 19-23.05.2002, Krynica (invited lectures: H J Penkalla)
- **2002**: 5th Workshop on Electron Probe Microanalysis of Metals Today, EMAS'2002, 22-25.05.2002, Szczyrk (invited lectures: PJ Ennis, HJ Penkalla)
- **2004** XVII International Conference Advanced Materials and Technologies, 20-24.06.2004, Łódź (invited lectures: H J Penkalla, K Urban)
- **2005** XII International Conference on Electron Microscopy of Solids, 5-9.06.2005, Kazimierz Dolny (invited lectures: H J Penkalla, K Urban)
- **2003, 2006, 2007, 2008** European Summer Schools on Advanced Electron Microscopy, AGH Kraków (invited lectures: H J Penkalla)
- **2008** XIII International Conference on Electron Microscopy, to be held in June, 8-11th in Zakopane (invited lectures: H J Penkalla, K Urban)

Besides the joint projects with the Institute of Reactor Materials, now the Institute of Energy Research - Materials Characterization and Properties and headed by Professor Lorenz Singheiser, a co-operation developed between the AGH (Prof Czyrska-Filemonowicz) and the Institute of Solid State Physics of FZJ, first with Professor Hans Ullmaier's group on helium embrittlement within the fusion materials programme (1983-1985) and later with Professor Knut Urban on advanced transmission electron microscopy and its application to the complex metallic alloys (CMAs). A PhD joint thesis supervised by Prof Urban (FZJ) and Prof Czyrska-Filemonowicz (AGH) is at present underway.

The large number of joint publications (over 200) indicates the excellent quality of the research investigations, but these have only been successful because of the long-standing professional and personal friendships that have been established over the last 25 years. Long may the co-operation and friendship between our organisations continue!