Making sense of defects in steel

Iain Baillie from Corus won the 2004 Institute of Materials, Minerals and Mining Young Persons’ Lecture Competition in April, with his talk on ‘Using laser generated ultrasound and ElectroMagnetic Acoustic Transducers (EMATs) to detect defects in continuously cast products’. The final was held at the Worshipful Company of Armourers and Brasiers, which supports the competition, on 28 April. It was a closely fought contest between eight young lecturers representing different regions of the UK and one finalist from Singapore. Iain, representing the North East Region, impressed the judges with his interesting presentation and they made a point during their questions that he should take out a patent on his development.

Iain, who wins £750 plus the Armourers and Brasiers Company medal, began by introducing the audience to the continuous casting process and the problems detecting defects using current techniques such as manual inspection, eddy current testing and CCTV cameras. He then went on to introduce EMATs, which have been around since the 1960s, but until recently haven’t really taken off. EMATs are non-contact devices that can generate and receive ultrasound signals. They are ideal for applications in the steel industry where non-destructive testing needs to be used.

During his time at Corus, Iain has developed a hybrid laser EMAT system that uses a pulsed Nd-YAG laser to generate ultrasonic waves in steel and an EMAT to detect the associated ultrasonic waves. Following successful trials at the University of Warwick, Iain informed the audience that the next step was hot furnace trials, which are currently underway at Corus TeSide Technology Centre. With nothing like this product currently on the market, Iain aims to develop the technique for application to production scale continuous casters since it is possible to operate the apparatus at high temperatures provided they are water-cooled.

The other seven finalists sustained the high standards of this annual competition as well, making the judges’ task of picking a winner very difficult. Chairing the judging panel was Roger Wainwright, Chairman of the Institute’s Local Affairs Board, while challenging questions from the floor were posed by the other three judges, Dr Ken Stanton of the Local Affairs Board, Dr Robert Kenway from Beta Technology and Professor Jane Plant from the British Geological Survey. As well as being judged on how well the finalists handled the judges’ questions, other criteria included the structure of the lecture and the clarity of presentation, the use of visual aids, the technical content of the presentation, and the quality of the summary.

Runner-up in the competition was Peter O’Hare from the University of Ulster, representing the Irish Region. Peter’s talk on ‘Biological characterisation of hydroxyapatite scaffolds for tissue engineering’ looked at bone scaffolds seeded with cells formed by combination sintering and salt leaching methods. The lecture covered in detail experiments carried out over a period of 48 hours, comparing the results from the two culture methods used. No cell attachment was observed on the scaffolds produced via the salt leaching method. However, increased MTT and AIP assays were seen on the seeded scaffolds formed by combination sintering. The judges praised Peter’s paper, systematic approach. The results forming the basis of Peter’s lecture clearly demonstrated the possible in vivo cell compatibility of the HA scaffold material and its potential as osteoconductive tissue. She explained how the material has become a promising substrate for future transistors because of its enhanced electronic and hole mobility. The focus of her PhD, Lydia shared details of experiments carried out to analyse the thermal stability of the material under various thermal-annalising conditions. Raman spectroscopy and SIMS observed the effect of thermal processing, on strain relaxation and Ge diffusion.

Peter received £400 for second place and Lydia received £200 for third, while the other five finalists received the £100 prizes, sponsored by the Armourers and Brasiers, in recognition for winning their regional competition. They were Ruth Sayer of Imperial College, representing the South East Region, Luca Cecchini of the University of Bristol, representing the South West Region, Gemma Davies from Rolls-Royce plc, representing the Midlands Region, Rachael Walker of Liverpool University, representing the North West Region, and Buddleja Jana of the University of Strathclyde, representing the Scottish Region.

The other award that was presented was the 2004 Niobium Student Research Award. Presented by Companhia Brasileira de Metalurgia e Mineração (CBMM) and Niobium Products Co (NBC), this year’s prize was awarded to Ms Marina Galano. For more information on the history and rules of the Young Persons’ Lecture Competition, contact Sarah Boad, Institute of Materials, Minerals and Mining, tel: +44 (0)1926 430185, e-mail: sarah.boad@iom3.org, or visit www.iom3.org.

Institute granted licence to award Chartered Scientist (CSci)

The Science Council has granted the Institute a licence to award the designation of Chartered Scientist (CSci). Any members or potential members who are employed in scientific roles and meet the requirements for BMIBM or FIBM (typically BSc/MEng, plus a minimum of four to five years relevant experience) may be eligible to apply. The licence to award will be used to designate the award holders.

Institute Membership – What’s in it for me?

This month’s section includes the final of the Young Persons’ National Lecture Competition, as well as details of the Institute’s licence to award the designation of Chartered Scientist, details of the Member’s Benevolent Trust report and accounts and a round-up of news from the regions.