Advances in electronics, in energy efficient transport technology and in energy generation from renewable sources require parallel advances in polymer chemistry. A key chemistry in all these areas is that of the epoxy group and there are currently exciting developments in this field. Advanced epoxy composites contribute to the increasing use of plastics in next-generation aircraft such as the Airbus A380 and the Boeing 787 Dreamliner. Toughened epoxy adhesives allow cars to be lighter and yet more crash resistant. Other epoxies hold together the blades of wind turbines, or the electronics in your phone, laptop or i-Pod.

Yet, for several years, one of us (Birkett) failed to find a conference that focussed on the chemistry of the oxirane group. Adhesion or other application oriented conferences are generally weak on chemistry; polymer conferences rarely feature many epoxy papers. We therefore took the view that we should organise ourselves a conference that filled this gap.

Consequently the SCI Materials Chemistry Group, in conjunction with the Republic of Ireland Regional Group, held a very successful two day meeting on the topic of Advances in Epoxy Chemistry at the Materials and Surface Science Institute, University of Limerick, on 28th -29th August 2008. Attended by delegates from nine countries and three continents, we were very impressed with the broad range of chemistries discussed and pleased with the balance of industrial and academic presentations.

Several of the academic papers are collected together in this special edition of Polymer International. The papers reflect the chemical versatility of the oxirane group and the range of applications of epoxy resins.

Armstrong, Ruether, et al focus on advanced epoxy composites and deal with the use of functionalised carbon nanotubes. Wurm et al show how the oxirane group can be used to create hyperbranched dendrimers, while Arnold and Döring present a fascinating range of novel metal complexes that can initiate cationic polymerisation of the epoxy group. We also have a mini-review by Sudo et al reporting the synthesis of interesting epoxy copolymers from dihydrocoumarin and related molecules. And finally, from a poster presented at the meeting, Nwankire et al discuss plasma polymerised silane surface pre-treatments, aimed initially for use with silicone-based elastomeric adhesives, but of potential application with elastomer toughened structural epoxy adhesives.

The consensus from lively discussion during the meeting was that much remains to do in developing epoxy polymer chemistry. Regarding epoxy composites, delegates suggested that whereas nanoclays and core-shell rubber particle reinforcement represent technologies ripe for industrial application, carbon nanotube composites are better suited - on grounds of cost and complexity - to niche applications that exploit their remarkable electrical and thermal properties.

Finally, we would like to thank our sponsors Henkel Ireland Ltd., and acknowledge the support of the University of Limerick Conferences Office, Materials & Surface Science Institute, our exhibitors and the Society of Chemical Industry’s Conferences Secretariat, without whom Advances in Epoxy Chemistry could not have taken place.

About the Organisers
The goals of the SCI Materials Chemistry Technical Interest Group are to promote materials chemistry, physics and engineering. We seek to identify new emerging technologies, create new uses for established materials and establish networks to facilitate knowledge transfer between academia, industry and other institutions.

The SCI Republic of Ireland Regional Group aims to foster better links between the molecular sciences, chemistry-based industry and the general public throughout the Irish Republic. We regularly arrange talks by expert speakers aimed at industrialists, chemistry teachers, university students and interested members of the public.

http://www.soci.org

About the Materials & Surface Science Institute

The Materials & Surface Science Institute (MSSI) at the University of Limerick is a national centre of excellence that generates state-of-the-art fundamental research on topics of industrial significance in the fields of surface science and materials. MSSI has gathered together faculty members from a range of academic disciplines (materials, physics, chemistry, biochemistry, and electronic, mechanical, biomedical and aeronautical engineering). MSSI utilises this interdisciplinary approach to develop and characterise materials from the atomic to the macroscopic scale, providing new materials, processes and applications, which are guided by a fundamental understanding of material properties and design requirements.

http://www.ul.ie/mssi

Gordon Armstrong & David Birkett
Organisers – Advances in Epoxy Chemistry
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