



## Scientific exchange

8th Coatings Science International Conference in Noordwijk, the Netherlands



Kirsten Wrede

For the 8th time, the Coatings Science International Conference (CoSI) gathered coatings experts from all over the world at the lovely North Sea resort Noordwijk in the Netherlands. All in all, 120 representatives of international institutes, universities and companies attended the annual meeting from 25-29 June.

"I think it was a very good conference with excellent speakers, and the thorough discussions following the presentations added a new dimension to the topics"

Kristian Petersen Nørgaard, Technical University of Denmark

During the conference, 34 lectures from both academia and industry were given, selected by a jury of experts. Prior to the conference, 144 lecture proposals were submitted which presents a significant increase compared to the number submitted in 2011 (115). In addition to the presentations, 49 posters were on display.

As usual, the conference put a clear focus on the scientific backgrounds of the latest technological developments relevant to coatings. Nevertheless, the audience was

also willing to discuss more industry-oriented projects. For instance, the paper "Monitoring of degradation process in automotive multilayer coatings using photooxidation index", given by Dr *Marc Entenmann*, Fraunhofer Institute for Manufacturing Engineering and Automation, Germany, achieved much attention.

The conference program, originally solely focused on organic coatings, had been enhanced by inorganic and hybrid systems in the past. "But we have decided not to mix the program any further," Chairman Prof. *Rolf van Bentem* emphasized.

### Polymer chemistry: self-stratifying coatings

This year's sessions concentrated on polymer chemistry, corrosion protection, weathering & photocure, curing & chemistry, functional coatings, material properties, and waterborne systems. As an example, Dr *Mark D. Soucek*, Department of Polymer Engineering, University of Akron, USA, delivered an interesting presentation on self-stratifying coatings.

A series of BPA-type epoxide primers and acrylic topcoats were prepared as a homogeneous solution in several solvents. The miscibility of the BPA-epoxide with the acrylic was adjusted by either polar or non-polar modification of the epoxide. The primer and a topcoat were applied in a single coating application and crosslinked with a melamine-formaldehyde resin. The



The technical presentations were followed by many questions and comments

stratification of the two polymeric binder systems was dependent primarily on both the polymer-polymer miscibility and chemical potential driving force their respective interface.

When the primer and topcoat were miscible and there was no driving force to the interface a homogeneously mixed system was observed. When the primer and top-

“CoSI offers scientific approaches in coating systems and a comfortable atmosphere, where participants can come together and think about challenging future projects”

Dr Marc Entenmann, Fraunhofer Institute for Manufacturing Engineering and Automation, Germany

coat was miscible and there was a driving force toward the interface, an enhancement of the primer at the film-substrate (F-S) interface, and topcoat at the film-Air (F-S) interface was observed. The bulk of the coating, however, was relatively homogenous. When the polymeric

binders were not miscible and there was a chemical potential to drive each of the polymers to their respective interface, a stratification was observed where the primer was concentrated from the F-S upward into the bulk film, and the topcoat was stratified downward from the F-A interface. In effect, application of a single coating was shown to replace two separate coating processes.

### New developments for waterborne systems

Saving the best for last – the final conference session, featuring waterborne systems, presented two award-winning papers:

Dr *Alexander Routh*, BP Institute for Multiphase Flow & Department of Chemical Engineering and Biotechnology, University of Cambridge, UK, gave a talk on “evaporation mediated self-assembly of nanoparticles: watching paint dry”. Drying dispersions are observed to display a number of homogeneities. In his talk, Routh described a number of these inhomogeneities. In the horizontal drying case he concentrated on film cracking and examined a wiggly crack instability. For larger films the occurrence of vertical auto stratification was examined. For two component systems it was possible to get composition stratification with one component preferentially migrating to the top surface. The controlling factors are the particle size, setting the diffusion rate, as well as any surface chemistry driving stratification.

Prof. *Joseph L. Keddie*, Department of Physics, University of Surrey, UK, presented a paper on “bespoke patterned coatings via infrared radiation-assisted evaporative lithography”. He introduced the new process “IR radiation-assisted evaporative lithography (IRAEL)”, which combines IR particle sintering with the concept of evaporative lithography. Keddie showed that the height of the surface features increases with an increase in several key parameters: the initial thickness of the film, the volume fraction of particles, and the pitch of the pattern.

The patterned coatings can function as “paintable” microlens arrays, applicable to nearly any surface. Compared with existing methods for creating textured coatings, IRAEL is simpler, inexpensive, able to create a wide variety of bespoke surfaces, and applicable to nearly any substrate without prior preparation.

### Award ceremony for best contributions

The conference ended with an award ceremony, which honoured the best scientific paper, the most innovative development and the best poster presentation.

The Science Award was given to Prof. Alexander Routh, University of Cambridge. Prof. Joseph Keddie (Department of Physics, University of Surrey, UK) received the Innovation Award (see previous paragraph).

“Thermal evaluation of a self-healing polymer network coating based on the reversible Diels-Alder reaction” was the title of the poster presentation that won the Creativity Award. The prize was given to *Gil Scheltjens* of the Vrije Universiteit Brussel, Physical Chemistry and Polymer Science (FYSC), Belgium.



Awards ceremony (from left to right): Gil Scheltjens, Prof. Bert de With, Dr Alexander Routh, Prof. Joseph Keddie, and Prof. Rolf van Benthem

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