



ECS-Short Course

Thin Film Coating and Drying – Fundamentals and Applications



September 5-6, 2009
Karlsruhe, Germany

ECS-Short Course takes place on Saturday and Sunday - September 5-6, 2009 - before the European Coating Symposium (ECS) 2009 in Karlsruhe, Germany. This two day course is designed to provide the technical understanding required to develop new film coating products and optimise the conditions of existing products. The course should benefit a wide range of people working in the film coating and drying fields, and new personnel wishing to become familiar with film coating and drying.

ECS-Short Course Instructors

- Prof. Dr. Wilhelm Schabel (KIT)
- Dipl.-Ing. Philip Scharfer (KIT)
- Prof. Dr.-Ing. Dr. h. c. mult. Ernst-Ulrich Schlünder (KIT)
- Dr. Ted Lightfoot (Du Pont)
- Prof. Dr. Norbert Willenbacher (KIT)
- Prof. Hadj Benkreira (University of Bradford)
- Dr. Peter Schweizer (Polytype)

ECS-Short Course Topics

Day 1

- Drying of Thin Films (W. Schabel)
- Simulation of Industrial Dryers (P. Scharfer)
- Selective Drying (E.-U. Schlünder)
- Industrial Dryers and Scale-up (T. Lightfoot)

Day 2

- Rheology of Coating Fluids (N. Willenbacher)
- Self-Metered Coating Methods (H. Benkreira)
- Pre-Metered Coating Methods (P. Schweizer)
- Gravure Coating (T. Lightfoot)

Instructor Biographies

(In order of short course appearance)



Prof. Dr.-Ing. Wilhelm Schabel is head of the Thin Film Technology (TFT) Chair at Germany's esteemed Karlsruhe Institute of Technology (KIT). TFT is supported by KIT's Elite Future Concept program along with a consortium of industrial organizations including Bayer, BASF and Roche. In 2004, Wil-

helm Schabel received his doctor degree in Chemical Engineering, with honors. His thesis, "Drying of Polymeric Films", earned him the Carl Freudenberg Award for the best doctoral thesis at the University of Karlsruhe. 2004 to 2006, Dr. Schabel led a research group at the University of Karlsruhe, and from 2007 to 2008 he served as a Research and Project Engineer at LOFO High Tech Film at Weil am Rhein, for the ShinKong Group (Taiwan). Among his honors and awards, Dr. Schabel was granted the Arnold Eucken Award in 2007 conferred by the Federation of German Chemical Engineers. In September 2008, the L.E. Scriven Award was presented to Dr. Schabel at the biennial meeting of the International Society of Coating Science and Technology in Marina del Rey, California. He is currently an ISCST Director and organizes the next biennial series of European Coating Symposia, the ECS 2009 in Karlsruhe, Germany. Prof. Schabel is an expert in mass transfer and thermodynamic in thin polymeric films, analytical techniques and numerical simulation tools for industrial film drying applications.



Dipl.-Ing. Philip Scharfer received his diploma degree in Process Engineering from the University of Karlsruhe (TH) in 2003 with distinction. He worked for his doctoral degree from 2003 to 2008 at the Chemical Engineering department and is currently waiting to defend his thesis "On Mass

Transport in Fuel Cell Membranes". In the past years Mr. Scharfer established the thin film research at Germany's esteemed Karlsruhe Institute of Technology (KIT) together with Prof. Schabel. Since March 2009, Mr. Scharfer is head of Thin Film Technology (TFT) at the KIT Campus North with new laboratories and modern analytical tools for coating and drying characterisation and a new pilot scale R2R coating facility. TFT is supported by KIT's Elite Future Concept program along with a consortium of industrial organizations including Bayer, BASF and Roche. Mr. Scharfer is currently an ECS committee member and organizes the 2-day European Short Course "Thin Film Coating and Drying – Fundamentals and Applications" at the next biennial series of European Coating Symposia (ECS 2009) in Karlsruhe. Besides his practical skills and his competence as a consultant, Mr. Scharfer is an expert in mass transfer and thermodynamic in thin polymeric films, analytical techniques and numerical simulation tools for industrial film drying applications.



Prof. Dr.-Ing. Dr. h.c. mult. Ernst-Ulrich Schlünder received his doctoral degree from the Technical University Darmstadt in 1962 under the supervision of Prof. Krischer. From 1964 to 1966 he was director of the Max-Planck-Institute for Fluid Research in Göttingen, Germany. In 1967

he moved to Karlsruhe to become full professor and director of the Institute of Thermal Process Engineering at the University of Karlsruhe (TH) as successor of Prof. Emil Kirschbaum, the founder of chemical and process engineering in Germany. After his retirement in 1997 - after 30 years in Karlsruhe - he taught as an Adjunct Professor at the University of Miami, Florida until 1999. In 2000, Prof. Schlünder moved back to Germany and until 2008 had a position as an Adjunct Professor at the Max-Planck-Institute for Dynamics of Complex Technical Systems in Magdeburg. During his academic career, Prof. Schlünder spent several years overseas as visiting professor at IIT Madras, India, UC Berkeley, USA, ENSIC Nancy, Fr, University of Canterbury, Christchurch NZ, University of Cambridge, UK. He gave short courses in "Heat Transfer in Packed, Agitated and Fluidized Beds" in various countries and a short course on "Drying" in Germany from 1972 until 2000 every year. Prof. Schlünders research was honored by various national and international awards. Some special fields of his interest in teaching and research are fundamentals of heat transfer, mass transfer and thermal separation processes, covering a wide variety of technical applications such as e.g. evaporation and drying processes implying solvent mixtures, mass transfer controlled dynamic azeotropes and selective drying. Prof. Schlünders is author of numerous scientific articles and text books.



Dr. E.J. (Ted) Lightfoot holds a B.S.E in Chemical Engineering from Princeton University along with a M.S. and Ph.D. from the University of Illinois at Urbana Champaign. Since graduate school he has been employed by DuPont in various businesses including photographic film, Teflon® and Tedlar®

films, Optilon® display films and optical coatings. He has worked in R&D, Manufacturing Technology, Application Development as well as management. He is certified as a Six Sigma Black Belt for Growth and is currently assigned as a Principal Investigator in DuPont's Photovoltaic Fluorinated Materials business. He was the first US citizen to become an Industrial Fellow at the University of Minnesota Center for Interfacial Engineering (where he studied drying stresses about particulate inclusions in photographic film). He teaches in the AIMCAL Converting School and through TAPPI served as chapter editor for the Roll and Web Defect Terminology (2nd Edition). He is a founding director of the International Society for Coating Science and Technology and currently serves as President of the ISCSST.



Prof. Dr. Norbert Willenbacher is head of the Institute of Mechanical Process Engineering and Mechanics at University of Karlsruhe (TH) and Karlsruhe Institute of Technology (KIT) since 2004. He received his diploma degree in Physics and his PhD from the University of Mainz. After his

dissertation at the Max-Planck-Institute for Polymer Research in Mainz he joined BASF SE, working there as a research associate in the fields of rheology of complex fluids and adhesion of soft polymers for 15 years. His current research interests are: rheology and microstructure of colloidal suspensions, emulsions & surfactant foams including new measuring techniques like optical microrheology, high frequency mechanical rheology and ultrasonic spectroscopy, stability and flow-induced aggregation of colloidal suspensions, rheological analysis and characterization of industrial high speed coating processes including extensional rheology of thickener solutions and related coating formulations, development and implementation of methods for in-line process control, rheological phenomena in microfluidic devices and processes, molecular principles of polymer adhesion. Prof. Willenbacher is president of the German Society of Rheology and assigned member of the ProcessNet Technical Committee on Rheology. He is section editor of *Current Opinion in Colloid and Interface Science* and member of the Editorial Board of *Rheologica Acta*.



Prof. Hadj Benkreira received his B.Eng and M.Sc degrees (Chemical Engineering) from the University of Bradford (UK) in 1976 and 1977 respectively. He stayed on at Bradford and obtained his PhD in the Fluid Mechanics of Coating Flows in 1980 under the supervision of Professor W.L. Wilkinson (FRS).

Following five years of EPSRC postdoctoral research, he joined the academic staff of the University of Bradford in 1985 and was endowed a Personal Research Chair in 1998 for research in Thin Film Coating and in Polymer Processing. He has published widely on roll coating flows, including forward, reverse, deformable and gravure and in recent years in Dynamic Wetting. He is presently Associate Dean for Research & Knowledge Transfer at the School of Engineering, Design & Technology of the University of Bradford, one of the UK's leading research institutions in polymer engineering. Professor Benkreira is member of several learned societies and colleges including the UK EPSRC Peer Review College, the ISCST of which he was the Vice President in 2006-8 and the European Coating Group which he founded with colleagues in 1992 and which now organizes the biennial series of European Coating Symposia.



Dr. Peter M. Schweizer received his Ph.D. in Mechanical Engineering from the Swiss Federal Institute of Technology in 1979, and he did post-doctoral research in coating flows at the University of Minnesota with Prof. Scriven in 1979 – 1980. From 1981 – 1986, Dr. Schweizer worked in the

Coating Flow Research Group at Kodak in Rochester, New York. From 1987 – 1996, he worked at ILFORD in Fribourg, Switzerland, where he assumed responsibilities for Process Technology and Engineering. From 1997 – 2000, Dr. Schweizer was Managing Director of TSE Troller Schweizer Engineering in Switzerland, one of the leading manufacturers of coating dies. Since 2001, he works for Polytype Converting in Fribourg, Switzerland, a supplier of coating and drying processes and a manufacturer of coating machines, where he is responsible for Process Development. Dr. Schweizer is co-editor of the book entitled *Liquid Film Coating*, which appeared in 1997. In 2006, he received the John A. Tallmadge Award for Contributions to Coating Technology from the International Society for Coating Science and Technology (ISCST).

Fees

ECS-Short Course Fee*	before July 1, 2009	after July 1, 2009
Thin Film Coating and Drying – Fundamentals and Applications	€ 950,-	€ 1050,-

*September 5-6, 2009 (fee does not include Symposium registration)

Payment and Cancellations

The total amount is due after receipt of the invoice. For cancellations received by **July 1, 2009**, the participation fee will be reimbursed less a processing charge of € 50,-. After the date a reimbursement cannot be made, however it is still possible to nominate a replacement. Our fees are not liable to VAT – Value Added Tax – (tax exemption in accordance with § 4.22 UstG), since GVT has a non-profit status.

Location – Novotel Hotel

The Symposium will be held at the Novotel Karlsruhe City. The hotel is located in the center of Karlsruhe within walking distance from shopping areas, restaurants, the castle, and the University Campus.

For participants of the European Coating Symposium rooms are available at reduced rates:

single room	€ 129.00 (breakfast included)
double/twin room	€ 148.00
three bed room	€ 167.00

IMPORTANT: To benefit from the reduced rates please book your room directly at Novotel before **July 24, 2009** under the reference “ECS 2009”.

- **Novotel Karlsruhe City**
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Supported by ISCST 2010 Chair:

Prof. Lorraine Francis
University of Minnesota



Registration Form

European Coating Symposium 2009
September 07-09, 2009

Please fill out and fax to +49(0)69 7564-414

GVT Forschungs-Gesellschaft
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Theodor-Heuss-Allee 25
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First Name / Last Name: _____

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Registration Fee	Early bird registration (before June 1, 2009)	Regular registration (after June 1, 2009)
<input type="checkbox"/> 2009 Symposium Registration	€ 650,-	€ 700,-
<input type="checkbox"/> University / Academic Registration	€ 500,-	€ 550,-
<input type="checkbox"/> Student Registration (proof required by fax)	€ 350,-	€ 400,-
<input type="checkbox"/> Exhibition Space with table (includes one Participant)	€ 950,-	€ 1050,-
<input type="checkbox"/> Registration for Organisers and TFT partners**	€ 350,-	€ 350,-
<input type="checkbox"/> Accompanying Person (Opening Reception, Get Together)	€ 50,-	€ 50,-

Registration fee includes: Opening Reception, Lunch, Coffee breaks, Beverages, Get Together (Evening in the castle)

** according to an agreement with the Symposium Chair

Name of the Accompanying Person (optional) _____

I will attend the **Opening Reception** (Sept. 6th)

I will attend the **Get Together** (Evening in the Castle) (Sept. 8)

I would like to sponsor ECS 2009 (please contact Symposium Chair).

Please do not include me on the list of participants for this symposium.

I have submitted an abstract

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<input type="checkbox"/> Thin Film Coating and Drying – Fundamentals and Applications –	€ 950,-	€ 1050,-

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City / Date

Signature / Stamp