

## Διακεκριμένη Ομιλία

**ΟΜΙΛΗΤΗΣ:** **Peter Wasserscheid**

Professor, Chair of Chemical Reaction Engineering  
University Erlangen-Nuremberg, Germany

**ΤΙΤΛΟΣ:** **Ionic liquid multiphase reaction engineering**

**ΤΟΠΟΣ:** Αίθουσα Σεμιναρίων ΙΤΕ/ΕΙΧΗΜΥΘ

**ΗΜΕΡΟΜΗΝΙΑ:** Παρασκευή, 10 Ιουλίου 2009

**ΩΡΑ:** 12:00

**ΠΕΡΙΛΗΨΗ:**

Ionic liquids are salts which are characterized - due to their special distribution of charges and due to their special shape of ions - by melting points below 100°. They represent a new class of non-molecular, liquid materials with unique properties. Many convincing applications in electrochemistry, analytics, synthesis, catalysis and engineering provide evidence that the use of ionic liquids can overcome limitations of traditional liquids and open the way for new research concepts in many fields.

The lecture will introduce the topic of multiphase ionic liquid catalysis by presenting an overview of specific catalysis relevant properties of ionic liquids. Its main focus will be on selected examples of organic/ionic liquid biphasic catalysis and of supported-ionic-liquid-phase catalysis (SILP-catalysis, see Figure 1).

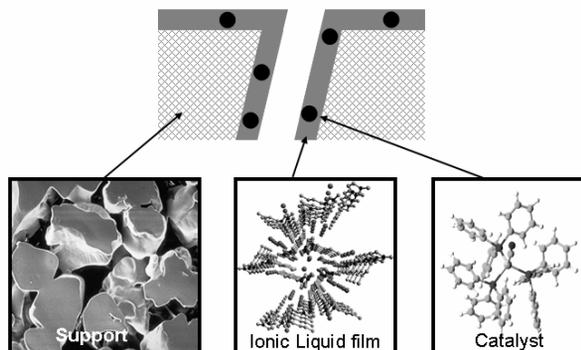


Figure 1: Schematic representation of a Supported Ionic Liquid (SILP) catalyst`



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For these examples the role of the ionic liquid in the catalytic process will be discussed in detail. Furthermore, the role of mass transfer processes and the question where the reaction takes exactly place in these multiphasic catalytic processes will be addressed. The discussion will be based on both kinetic and spectroscopic results from our laboratories.

## **Biographical Sketch: Professor Peter Wasserscheid**

### **CV:**

Born 1970 in Würzburg; 1991 – 1995 studies of chemistry at the RWTH Aachen; 1995 diploma thesis with Prof. Dr. W. Keim, RWTH Aachen; 1995-1998 PhD-thesis with Prof. Dr. W. Keim, RWTH Aachen; 1998 post-doc with BP Chemicals/Sunbury/GB; 1998-2002 habilitation at the „Institut für Technische Chemie und Makromolekulare Chemie der RWTH Aachen“ – topic: „Ionic Liquids – a New Solvent Concept for Catalysis“; 9/1999: co-founder of „Solvent Innovation GmbH, Cologne“; since 10/2003: Head of Institute of Chemical Reaction Engineering, University of Erlangen-Nürnberg.

### **Awards:**

1996: DECHEMA-Student- Award;  
2000: Haltermann Innovation Award 2000 of the Haltermann Ascot GmbH;  
2000: Carl-Zerbe-Award of DGMK;  
2000: DECHEMA-Award of the Max-Buchner research foundation;  
2001: “Hochschullehrer-Nachwuchspreis” of DECHEMA;  
2003: Innovation award of the German Industry (together with „Solvent Innovation GmbH, category: start-up).  
2006: Gottfried-Wilhelm-Leibniz award of German Research Foundation

### **Publications:**

- 130 peer-reviewed papers, 35 patents;  
- „Ionic Liquids in Synthesis“ (with Tom Welton as co-editor), Wiley-VCH, Weinheim, 1st edition 2002, book with 380 pages; 2nd edition 2007, two volumes 721 with pages.



Χρόνια

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### **Research Activities:**

P. Wasserscheid has a strong expertise in homogeneous catalysis and in multiphasic catalysis using so-called ionic liquids as catalyst immobilization matrix. The group belongs to the top research teams in developing the ionic liquid technology for catalytic applications (more than 75 publications in the last five years in this field). For selective hydroformylation, oligomerization, hydrogenation and carbonylation reactions as well as for functionalization reactions of aromatic compounds, Wasserscheid and his group could demonstrate enhanced performance of ionic liquid catalyst solutions vs. classical catalytic systems. Many reactions have been already transferred into continuous, liquid-liquid multiphasic reactors, e.g. the Ni-catalyzed dimerization of propene (loop reactor, IL/products), the Ni-catalyzed codimerization of ethylene and styrene (tube reactor, IL/compressed CO<sub>2</sub>) and the Pd-catalyzed dimerization of methylacrylate (CSTR, IL/toluene-products). A main goal of these studies concerned the investigation of mass transfer effects and "the real place of reaction" (phase boundary, diffusion layer, bulk ionic liquid). From this pioneering work it has become evident that mass transfer effects often play a decisive role in biphasic catalysis using ionic liquids both for overall reaction rate and selectivity.

Further research activities centre on the new "Supported Ionic Liquid Phase (SILP)"-Technology that has been recently developed by the group and others. The SILP catalytic concept offers a very efficient ionic liquid utilization and provides relatively short diffusion distances of reactants compared to conventional two-phase organic-ionic liquid catalyst systems.

The group is also among the leading experts in selective oligomerization reactions of ethylene to 1-hexene and 1-octene using Cr-metallacycle complexes in homogeneous single phase catalysis.

### **Scientific activities:**

Chair of DECHEMA-working group „Advanced fluids (ASTA)"

Initiator and Coordinator of the DFG-priority program (SPP 1191) "Ionic Liquids".

Referee for DFG, AiF, Humboldt Foundation and various international organisations in USA, France, Great Britain and Switzerland; referee for many scientific journals mainly in the field of catalysis and reaction engineering.