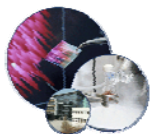


DISCUSSION FORUM Roughness Aspects in Wetting and Adhesion

DFG-Forschergruppe



Leibniz Institute of Polymer Research Dresden



30 March 2009

In 1876 Gibbs elaborated the fundamentals of the thermodynamic theory of capillarity; his paper on the equilibrium of heterogeneous substances was taken as a basis for all subsequent theoretical and experimental wetting work. Since then, diligent work has been performed to describe the wetting behaviour of heterogeneous systems, thereby determining the surface energies of liquid and solid bodies, and in this manner predicting their adhesion behaviour. Over a period of time, plenty of literature have been accumulated on this problems, proposing various measurement techniques and different evaluation possibilities including even criticism of one or other computational algorithm or fundamental idea. However, consensus exists among the authors as to the adhesion of compounds: good wettability of the components is absolutely necessary for good adhesion.

Surface roughness has a significant effect on wetting and adhesion. Firstly, Wenzel reported on the interdependency of wettability and surface roughness for polar surfaces in 1936. The roughness-dependent water repellence from nonpolar surfaces was first studied by Cassie and Baxter in 1944. This phenomenon gained very little scientific interest until recent years despite the fact that fluid-solid interactions have been extensively studied during the past. It has been demonstrated that even molecular scale topography contributes to contact angle hysteresis. Therefore, the topographical characterisation has to be carried out with high resolution and all over relevant different length scales. Compared to artificial textured surfaces, the description of the form and shape of real surfaces with complex random topography sets high requirements for surface microscopy and image analysis. Evidently, peak-to-valley height parameters of the root-mean-square (RMS) roughness may be regarded as only indicative concerning surface porosity or topography-corrected wetting behaviour.

The main idea of our workshop is to discuss roughness aspects from different points of view, and their impact on wetting and adhesion. This will demonstrate that the different set of parameters describe and identify surfaces of different topography and morphology. The challenge to be met is to quantify a real surface not only by RMS roughness but also through characteristics like, for example, effective surface area, height asymmetry, surface porosity, size and form of local maxima, and others. In this way, our knowledge about the topography role in phenomena such as wetting, adsorption, liquid penetration and adhesion can be considerably enhanced.

Invited Speakers



Prof Dr Abraham Marmur
Technion - Israel Institute of Technology, Haifa/Israel
Dr Bo Persson
Jülich Research Centre, Germany
Prof Dr Kazimierz Malysa
Institute of Catalysis and Surface, Polish Academy of Science
Cracow/Poland
Dr Radomir Slavchov
Sofia University, Department of Chemical Engineering, Bulgaria
Dr Vitaly Kocherbitov
Biomedical Laboratory, Health and Society, Malmö University, Sweden
Dr Alla Synytska
Leibniz Institute of Polymer Research Dresden/Germany
Mrs Sandra Boerner - EU consultant
Leibniz Institute of Polymer Research Dresden/Germany

We are looking for to seeing you !
The Organizers

Additional information at
<http://www.ipfdd.de/Veranstaltungen.6.0.html?&L=0>

How to get to the Institute

... by train

The Institute is quite close to the main rail station Dresden-Hauptbahnhof. It is a five-minute walk from south exit 'Bayrische Strasse' in the direction of 'Hohe Strasse'

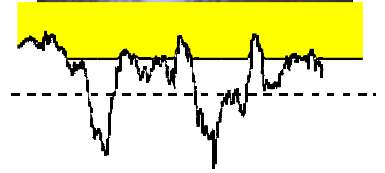


... by airplane

There is a suburban train to the main rail station Dresden-Hauptbahnhof: travel time 25 minutes, departures every 30 minutes.

**Maximum
40 participants
Registration fee
150 €**

DISCUSSION FORUM on Roughness Aspects in Wetting and Adhesion
30 March 2009 in Dresden



Greetings

9:00 – 10:00 **local registration**

10:00 – 10:15 Gert Heinrich, IPF Germany

10:15 – 11:00 **Symmetrical and asymmetrical hybrid particles: design, properties and perspectives**

Alla Synytska, IPF Germany

11:00 – 11:45 **Hydration of amphiphilic surfaces: sorption calorimetry and molecular dynamics simulations**

Vitaly Kocherbitov, Malmö University, Sweden

Lunch

Wettability of randomly rough surfaces

13:00 – 13:45 Radomir Slavchov, Sofia University, Bulgaria

Capillary bridges and adhesion

13:45 – 14:30 Bo Persson, Jülich Research Centre, Germany

Coffee break

Wetting on rough surfaces

15:00 – 15:45 Abraham Marmur, Haifa Technion Institute, Israel

Influence of hydrophobic surface roughness on kinetics of the three phase contact formation

15:45 – 16:30

Kazimierz Malysa, Academy Sci Cracow, Poland

Overview about European Research: Participation in the 7th framework program

17:00 – 18:30

Sandra Börner, IPF Germany

19:00 – open Dinner

**Colloidal particles:
modification & characterisation**

**Roughness &
surface energetics**

Wetting, spreading, penetration

**EU funding:
opportunities & discussion**



Prof Dr **Gert Heinrich**: **Organiser** and **Sponsor** of the Discussion Forum

... studied Physics at the Friedrich-Schiller-University in Jena; received his PhD at the University of Technology in Merseburg in Polymer Physics, and finalised his Habilitation in 1986; between 1987 and 1990 worked as a Guest Professor at the University of Prague and as an Associate Professor for Theoretical Physics in Merseburg. Between 1990 and 2002 he worked as a Senior Research Scientist and Head of Materials Research for Continental AG, Hannover. Since 2003 G. Heinrich has been Head of the Institute of Polymer Materials at the Leibniz Institute of Polymer Research in Dresden. Gert Heinrich is a member of the Mechanical Engineering Faculty at the University of Technology in Dresden. He holds the Chair of Polymer Materials at the Institute of Material Sciences in particular.



Dr **Victoria Dutschk**: **Organiser** of the Discussion Forum – scientific aspects

... graduated from Odessa State University (Ukraine), Faculty of Mechanics and Mathematics in 1988; Diploma in Mathematics; obtained her PhD in 2000 at the University of Technology Dresden, Faculty of Mechanical Engineering, Department of Material Science. She has been working as a research associate at the Leibniz Institute of Polymer Research Dresden since 1994. Her research activities are focused on a mechanistic understanding of manifold interfacial phenomena involving surface active agents. The main research field 'Interfacial Engineering' is related to fundamental material research having strong links with industry covering adhesion phenomena, surface topography and roughness analysis, wetting and interfacial dynamics and the spreading of aqueous surfactant solutions



Ass jur **Sandra Börner**: **Organiser** and **Speaker** of the Discussion Forum – administrative aspects on a European level

... after her studies of jurisprudence, she worked as a consultant to the Managing Director at the Institute for Testing Materials (tasks: intensive participation during Airbus A380 project – transport and testing Dresden). She has been working at the Leibniz Institute of Polymer Research Dresden as a EU project coordinator since December 2005 (tasks: contractual and financial aspects, intellectual property rights (IPR), supporting researchers during the proposal procedure and while running projects, incl. reporting etc).



Mrs **Claudia Nöh**: **Organiser** of the Discussion Forum – administrative aspects

... she has been working as a secretary of the departments Polymer Interfaces and Mechanics & Fibre Formation at the Leibniz Institute of Polymer Research Dresden since November 2008. She is the person who works without complaint behind the scenes. She is someone who is reliable and dependable and produces excellent work in our department.



Dr **Alla Synytska**: **Speaker** of the Discussion Forum

... graduated from the Ivan Franko Lviv National University (Ukraine) in 1996; Diploma in Chemistry with Effect of Surfactants on Structure and Rheological Properties of Aerosil Dispersions; between 2002 and 2003 passed training courses within the European Graduate College; obtained her PhD in Chemistry in 2005 at the University of Technology Dresden 'Influence of Chemical and Topographical Heterogeneities on the Properties of Polymer Surfaces'; a scientist at the Leibniz Institute of Polymer Research in Dresden; her research activities focuses on wetting phenomena on smooth and rough structure surfaces, design of regular structured surfaces from "core-shell" particles, colloidal crystals, design of ultrahydrophobic surfaces using core-shell particles, stimuli responsive nano- and microstructured surfaces, surface modification of planar and curved surfaces via grafting of polymers, asymmetrical Janus particles and symmetrical core-shell colloids



Dr **Vitaly Kocherbitov**: **Speaker** of the Discussion Forum

... is a Russian currently working in Sweden; graduated from the St. Petersburg State University in 1993; Diploma in Chemistry; obtained his PhD in Physical Chemistry in 1997 at the same University with 'Thermodynamic stability and phase equilibria in system n-propanol – acetic acid – water – n-propylacetate'; a scientist in Biomedical Laboratory; Health and Society, Malmö University (Sweden); his main interests are thermochemistry, hydration of surfactants, lipids and proteins, cellulose-water interactions, nanomaterials, liquid crystals, statistical thermodynamics, fluid phase modelling, chemical kinetics



Dr **Radomir Slavchov**: **Speaker** of the Discussion Forum

... graduated from the St. Kliment Ohridski Sofia University (Bulgaria) in 2003; Diploma in Chemistry; obtained his PhD in Physical Chemistry at the same University in 2007 'On the theory of charged heterogeneous surfaces. Electric interactions in Langmuir monolayers and semiconductor surfaces'; his research interests are focussed on surface forces, adsorption at liquid interfaces, thin films, electric interactions in colloid systems, thermodynamics of surface phases, phase transition, mixed micelle formation, numerical methods, chemical kinetics and equilibrium reactions, theory of solutions, stochastic and chaos theory



Dr **Bo Persson**: **Speaker** of the Discussion Forum

... is Swedish and currently working as a scientist at the Research Centre in Jülich (Germany); graduated from the Chalmers University of Technology in Göteborg (Sweden) in Technical Physics; obtained his PhD at the same University in Mathematical Physics, Solid State Theory Division, Institute of Theoretical Physics; his research activities presently focuses on adhesion, rubber friction and crack propagation in rubber;

Awards: the VOLVO prize in Physics; the 1996 Walter-Schottky-Prize; the John Yarwood Memorial Medal 1997; Annual Address to the British Vacuum Council 1997; Japan Society for the Promotion of Science Award 2004



Prof Dr **Abraham Marmur**: **Speaker** of the Discussion Forum

... works at the Technion-Institute of Technology in Haifa, Israel. His research interest covers a broad range of interfacial and colloidal phenomena, particularly in wetting, adhesion and capillarity, contact angle theory and measurement, ultra-hydrophobic surfaces, spreading on surfaces: the relationship between adhesion and wetting, capillary penetration into porous media, wetting of powders
Honours: Taub Award for Excellence in Research 2002; Excellent Lecture recognition 1999, 2002, 2004; Muriel and David Jacknow Award for Excellence in Teaching 1999; Advisory Board J Adhesion Science & Technology 1990-1992, 2002-2004, Advisory Board J Colloid Interface Science 1986-1988, Reinforced Plastics/Composites Institute Best Paper Award 1985, Gutwirth grant 1976, Fulbright-Hayes travel grant 1974



Prof Dr **Kazimierz Malysa**: **Speaker** of the Discussion Forum

... works at the Institute of Catalysis and Surface Chemistry at the Polish Academy of Sciences in Cracow; his research interests are surface chemistry and stability of dispersed systems, foams and thin liquid films - their formation properties and mechanism of stability, adsorption at interfaces, surface elasticity forces and kinetics of adsorption, specific forces of interactions, fundamentals of flotation, wetting, elementary act of flotation, motion of bubbles, drops and particles, effect of adsorption on bubble motion, bubble collisions with various interfaces, three phase contact formation and dynamics of the colliding bubble attachment, role of air adhering to hydrophobic surfaces in formation and stability of dispersed systems, hydrodynamic interactions near interfaces so called 'wall effects'

REGISTRATION FORM

Discussion Forum on Roughness Aspects in Wetting and Adhesion
30 March 2009 in Dresden (fees: 150 €)

fill it out clearly (printed characters) and send it to:

Fax: **0049 (0) 351 4658 98599** or Mail: **boerner@ipfdd.de**

Title	
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Surname	
Institution	
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Country	
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place, date

signature

stamp of the institute

Choose your payment type:

<input type="checkbox"/> Bank transfer	<input type="checkbox"/> Credit Card
reference " Discussion Forum Dresden ", specifying the name of the participant must be made payable to: Account holder: Leibniz-Institut für Polymerforschung Dresden e. V. Bank: Dresdner Bank AG Dresden Account No.: 0526287200 National Bank ID: 850 800 00 IBAN: DE 0485080000 0526287200 BIC: DRESDEFF Please send the total due amount free of any bank charges.	please print and complete the proper form Authorisation for Credit Card Payment fill it out clearly with all required information and then send it ONLY by FAX to: 0049 (0) 351 4658 98599

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30 March 2009 in Dresden**

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Name of the participant
(if different from card holder):

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Credit card N°: _____

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Date and signature of the card holder: .

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