218th American Chemical Society National Meeting & Exposition

New Orleans, Louisiana, USA
August 22-26, 1999

The 218th American Chemical Society National Meeting & Exposition was held in New Orleans, Louisiana. New Orleans is famous for its contributions to jazz and other types of music and for its Mardi Gras parade. New Orleans has a lot to offer to the tourist from the French Quarter to swamps full of alligators, from the Museum of Art to a trip along the Mississippi River. However, at about 90 F and near 100% humidity, most of the 11,734 attendees preferred to stay inside and listen to the presentations (and there were 5656 papers in 33 divisions) or to visit the 392 exhibits in the exposition. Several manufacturers of rheometers were on hand at the exposition: Paar Physica, Rheometric Scientific and Haake.

Many presentations highlighted the synthesis and chemical structure, physical properties and applications of various systems and their relationship to rheology. In particular there was a trend of finding synthetic approaches to tailor the structure of polymers and to find models to describe their aggregation characteristics and applications in various systems used in detergents, coatings, catalysis, oil drilling, biotechnology and pharmaceuticals. In a presidential event on materials, professor deGennes (College de France) shared his dreams of new forms of matters, hopes and illusions and discussed his pursuit of materials such as electrolytic solutions and swollen gels but with high efficiency, speed and the ability to disseminate heat to prevent fatigue. It was impossible to attend all the presentations in the various divisions and it is certainly impossible to summarize the wealth of information that was presented at the meeting. The following is only a description of some of the papers presented at the various symposia. Due to space limitations, only the author who presented the paper is mentioned. For a full list of the presentations, authors, abstracts and preprints, please consult the proceedings of the divisions.

Novel Surfactants – Synthesis, Properties and Applications (Division of Colloid & Surface Chemistry)

The papers presented at this symposium encompassed a wide range of new surfactants, their synthesis, properties and applications with a focus on structure-property relationship. D.H. Thompson (Purdue University, USA) discussed the synthesis and drug delivery applications of acid labile and oxidative labile vinyl ether surfactants. J.M. DeSimone (University of North Carolina, USA) described surfactants designed for CO_2 processes. F.M. Menger (Emory University, USA) discussed amphiphilic surfactants with different architecture such as rigid hydrocarbon chains, gemini surfactants and fiber forming surfactants. T.A. Camesano (Pennsylvania State University, USA) also discussed gemini surfactants. D.G. Whitten (Los Alamos National Laboratory, USA) described supramolecular assemblies based on surfactant polymer interactions. R. Zana (Institut Charles Sardon, France) described a new class of dimer and oligomer surfactants containing two or more amphiphilic moieties. J.H. Fendler (Clarkson University, USA) discussed self-assembly of metallic and semiconducting colloidal nanoparticles. W.T. Ford (Oklahoma State University, USA) described the synthesis of polyampholyte microgels and their application as colloidal catalytic media. C.A. Bunton (University of California, Santa Barbara, USA) discussed the reactivity of micelles derived from sulfobetaine. Other papers discussed the interaction of surfactants in biological systems and the effects of liquid crystal assemblies. Other symposia sponsored by this division included fundamentals of colloid and surface chemistry, medical and biological applications of surface chemistry, theoretical modeling of metal-liquid interfaces and interfacial properties on the submicron scale. A session in this symposium was devoted to rheological and wetting properties at interfaces.

Polymeric Surfactants (Division of Polymeric Materials: Science and Engineering)

Polymeric emulsifiers and stabilizers, hydrophobically modified polymers, polysoaps, polymer self-assembly at interfaces, polymer/surfactant association and amphiphilic comb and block copolymers were the topic of discussion in this symposium. The papers presented focused on the chemistry of the polymer and its role in determining the physical properties of the system. Various models were proposed to describe the architecture and the interactions of the polymers. M. Rubinstein (University of North Carolina, USA) discussed models and the effect on solution rheology of associating polymers and the structures formed in solution. M. Klapper (Max

surement of interfacial shear rheology, shear induced orientation of fatty acid monolayers, bulk and surface behavior of polymer-surfactant solutions, structural influences and the behavior of HEUR associative thickeners in aqueous solutions, block copolymer and reverse micelles in aqueous solutions, shear and pH induced behavior in various water-soluble polymers and rheological characterization of perfluoroether lubricant.

This meeting was an excellent forum for the exchange of ideas between researchers in industry and in academia. It provided an update on recent developments in the search for molecules that affect the rheological properties of various systems. It emphasized the progress made in understanding how these molecules function and pointed to future trends and the need to develop better techniques and theoretical models to follow and describe their behavior.

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Conference Report II

11TH EUROPEAN DRAG REDUCTION WORKING MEETING

PRAGUE, CZECH REPUBLIC
SEPTEMBER 15-17, 1999

In this year the European Drag Reduction Working Meeting was held between 15 and 17 September 1999 in Prague, the metropolis of the Czech Republic. This working meeting was the continuation of a long series of meetings over the last decades within the region of drag reduction phenomenon.

The conference was organised by Dr. Zdeněk Chára and Prof. Jaroslav Pollert from the Institute of Hydrodynamics ASCR respectively the Laboratory of Ecological Risks in Urban Drainage LERMO of the Czech Technical University in Prague. All sessions took place at the Faculty of Civil Engineering of the Czech Technical University.

This was a highly successful meeting, which attracted more than 70 participants from all over the world. There were nearly 50 papers presented orally divided into the two classical regions of the drag reduction phenomenon, active and passive drag reduction. No parallel sessions were organised so that the participants had the possibility to attend all lectures.

The organisers defined the objectives of the meeting as:

- To bring together active research workers in the field of turbulent drag reduction and separation control for an exchange of the most recent results,
- to bring together engineers and scientists from industry with the research workers from universities and national research agencies to discuss and learn about practically problems of drag reduction to encourage collaborative research and
- to encourage collaborative research.

The drag reduction phenomena and also this meeting were separated into the following subjects:

- Passive drag reduction (riblets, flow control, compliant walls)
  - devices to reduce turbulent wall shear stress, *e.g.* riblets and other nonplanar or compliant wall configurations, "biological reducers", *etc.* This was for example delivered by Dr. D. W. Bechert and his research group (Berlin), Prof. K.-S. Choi (Nottingham), Dr. J. van der Hoeven (Delft), Prof. P. Orlandi (Roma) and Prof. K. Watanabe (Tokyo).

- Active Drag Reduction (polymers, polymer injection, two phase flows, surfactants)
  - polymer and surfactant additives alone or in combination with any of the above mentioned manipulative devices, for example represented by Prof. H.-W. Bewersdorff (Senftenberg), the research group of Prof. B. Gampert (Essen), Dr. J. Myška (Prague), Prof. P. S. Virk (Cambridge, USA) and Prof. J. L. Zakin (Ohio).
  - experimental, analytical, numerical and semi-empirical investigations on the above mentioned items (*e.g.* Prof. M. Itoh (Nagoya), Dr. Y. Kawaguchi (Tsukuba), Prof. R. Sureshkumar (St. Louis), Prof. H. Usui (Kobe)) and
  - practical applications focused on heating and cooling systems (*e.g.* Dr. F. Hammer (Aarhus), Prof. M. Hellsten (Stenungsund)).

After some introducing words given by Dr. Chára and Prof. Pollert the meeting started with two keynote lectures. The first keynote lecture was given by Professor Jacques L. Zakin, of the Department of Chemical Engineering of The Ohio State University, USA with the title "Some Surprising Behaviors of Surfactant Drag Reduction Systems". It was by chance a good introduction of my own presentations with the titles "Relationship Between the Molecular Configuration and the Drag Reduction for Extremely Dilute Polyelectrolyte Solutions" and "The Influence of the Shape of the Dissolved Macromolecules on Drag Reduction for Highly Diluted Polymer Solutions".

Prof. Zakin lectured about the significant differences in mean flow behaviour between surfactant and polymer drag reduction systems. These include diameter effects, recovery from mechanical degradation, steepness of ultimate mean velocity profiles (v^+ vs. y^+) and maximum drag reduction asymptotes. He discussed differences in the details of turbulence behaviour between surfactant and polymer solutions in channel or pipe flow. A striking feature common to both is the "stress deficit", which results from low values of Reynolds stresses which, in some cases, can be zero across the whole profile.

The second keynote lecture, "Mechanisms of Turbulent Drag Reduction Using Passive Techniques" was delivered by Professor Kwing-So Choi from the University of Nottingham, Division of Mechanical Engineering, UK. Prof. Choi talked about that passive techniques for drag reduction, such as riblets and complaint coatings, can give between 5 to 20% reductions in drag without energy input to the flow system. He compared this effect with the active techniques which required to spend some energy initially in order to obtain more substantial drag reductions. Prof. Choi explained in his presentation that there are many other active techniques available, such as boundary layer suction, gas injection, magneto-hydrodynamic control and spanwise-wall oscillation, all which will give a substantial amount of drag reduction, but at an expense of energy input. The strategies for turbulent drag reduction, whether using passive and active techniques, demand a good understanding of near-wall structure of the turbulent boundary layer, particularly the mechanism involved in producing turbulent wall-shear stress.

These two keynote lectures were an excellent motivation for all following presentations and a very good foundation for discussions. There were many papers dealing with the comparison of analytical or semi-empirical predictions and experimental observations. A more practical flavour was found in a few contributions in which the drag reduction phenomena are demonstrated in praxis for example in the district heating system of Herning in Denmark. Dr. F. Hammer, Bruun & Sørensen Group AS, Aarhus, Denmark, refered in his presentation that they have more than 10 years of practical experience with drag reduction and he believed that the use of this technology may soon be applicable in daily operation. This is due to the up-to-day standard of a new additive. It has been obvious that the application of the additive is relevant and interesting, primarily in connection with hydraulically-closed district heating transmission pipelines.

The proceedings of this meeting was published by the Institute of Hydrodynamics ASCR, Pod Pat'ankov 5, 16612 Prague 6, Czech Republic, ISBN: 80-238-4442-3.

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This is an extract of the complete reprint-pdf, available at the Applied Rheology website
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