6th DGK Workshop "Rheology of Cosmetic Emulsions" and "25 Years of Rheology at Beiersdorf"

Hamburg, Germany
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6th DGK Workshop "Rheology of Cosmetic Emulsions"

Since the end of the last millennium rheology has played an ever increasing role in the cosmetics industry. That is why Beiersdorf AG, in the name of the Analytical Chemistry Working Group of the DGK (German Society for Basic and Applied Cosmetics), extended an invitation to the DGK Workshop „Theology of Cosmetic Emulsions" in Hamburg on 20 and 21 October 2010. Leading the very well organized workshop was Rüdiger Brummer (head rheologist of Beiersdorf AG) and his team. As with all other DGK Rheology Workshops, he was responsible for the planning, organization and execution. Once again he was able to bring together in Hamburg interesting speakers from the industry and academia. The increasing number of participants, from 40 in 1999 to 80 in 2010, also shows that this workshop is attracting more and more interest. In the meantime, participants come not just from Germany but also from all over Europe and abroad.

The participants found a major forum for interesting and open discussions with rheology experts from the industry, universities and seven instrument manufacturers. The chance to have something explained directly at the instruments was especially appreciated. Prof. Windhab from the ETH Zurich presented in his plenary lecture the whole spectrum of rheology from process-structure-property relationships to the dynamic structural analysis of emulsions to the surface rheology of w/o, o/w and w/w formulations. He showed how rheology can be used to generate information from the molecular, meso as well as macro scale. There was no need for Prof. Windhab to emphasize that a solid background in rheology is needed to do the correct measurements for the problems facing us.

Afterwards, for the first time in a Rheology Workshop, a tandem lecture was given by academia and the industry. Bernhard Hochstein from the University of Karlsruhe (KIT) and Rüdiger Brummer from Beiersdorf AG presented the theory and practical application of rheology for cosmetic emulsions in a systematically structured and clear lecture. The alternation between theory (Hochstein) and practice (Brummer) was well coordinated to fit the topic and therefore easy for the listeners to follow. The two speakers ended the lecture with a flow chart with recommendations on how measurements should be done and the conclusions that can be drawn from them. This printout was in great demand among the participants. After this tandem lecture Maik Nowak (TA Instruments) performed live measurements, elaborating especially the practical aspects and the demands on measurements resulting from them. For the DGK evening event, Brummer came up with something really special. It was a boat ride on the Elbe with a generous buffet on board and a guide who pointed out the special features of the Hamburg harbor and knew everything there was to report about the giant container ships, especially those from Asia. The participants loved this event.

The first part of the next morning was dedicated to talks from the industry that dealt with the "rheological life of a w/o emulsion" (Markus Schmitt from Schwan Stabilo Cosmetics), ringing gels (Björn Klotz from Cognis) and the rheology of carbopol polymers. Anton Wittersheim and Lothar

Figure 1 (left): Rüdiger Brummer (right) and his team.

Figure 2: The speakers.

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Gehm from the Analytical Chemistry DGK Working Group reported on problems with the results of round robin tests and how they would like to improve them. The results of viscosity measurements from the year 2003 still had deviations of up to 45%, which could then be improved in 2007 to 25% errors for shear rates >1 s^{-1} by defining more requirements. For the lowest shear rate, however, the error bars were still 80%. This led to a small round robin test with test oils (Newtonian flow behavior). These results were clearly better overall, with the error in the required range (< 15%). What makes it so difficult to measure products with non-Newtonian flow behavior? The working group made this the topic of a bachelor's thesis this year, the results of which are to be presented at the next workshop. The problems involved were formulated by Lothar Gehm in his talk: What type of instrument is optimal? What boundary conditions need to be maintained? What is the best measuring geometry? Christine Bilke-Krause and Tobias Winkler (Krüss) explained to the participants how foams can be measured and discussed the possibilities of interfacial rheology and the information that can be gained from it.

In the last two talks from the University of Karlsruhe, Manfred Wilhelm and Katrin Reinheimer took the listeners into the world of non-linear analysis of oscillation experiments. This is a relatively new and interesting field of work of Manfred Wilhelm, who gave a vivid presentation of the dry theoretical principles. Ms. Reinheimer then presented initial results that clearly showed, however, that much work is still needed here. With the last talk, the topics presented spanned from basic principles to forward-looking work in the field of rheology.

"We are at this workshop not just as hosts but also to underscore our scientific expertise in the field of rheology," said Brummer. For the guests the workshop represented a valuable exchange of knowledge. Dr. Björn Klotz from Cognis GmbH, an important business and research partner for Beiersdorf, said: "To me the meeting this year was an excellent mix of basic principles and areas that represent new frontiers." Prof. Dr. Andrea Wanninger from the University of Niederrhein hoped that "next year brings a good flow of ideas and a lively inflow of money for research."

25 Years of Rheology at Beiersdorf

Beiersdorf invited guests to a gala event "25 Years of Rheology at Beiersdorf" following the workshop. Attending this event were cooperation and business partners from the industry and universities not just from Hamburg but also from Bayreuth, Erlangen and Switzerland.

The Hamburg musician Prof. Gottfried Böttger composed a "Rheology Ragtime" especially for this event and in another part presented his music together with a video about flow phenomena. The audience was fascinated by this performance and applauded enthusiastically.

Prof. Klaus-Peter Wittern, Director of Research and Development at Beiersdorf AG, welcomed the guests and paid tribute to the work of the Analytics Department at BDF and the work of the Rheology Unit, which is highly respected not only inside but also outside the company, something due in large part to Rüdiger Brummer. The invited lecture was given by Prof. Erich Windhab from the University of Zurich (ETH), who took the audience on a viscoelastic journey through time.

Figure 3 (left): The Auditorium.

Figure 4 (middle): Prof. Gottfried Böttger.

Figure 5 (right): Maik Nowak.

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Figure 6 (left above): Lothar Gehm.

Figure 7 (middle above): Anton Wittersheim.

Figure 8 (right above): Technical discussions.

Figure 9 (left below): Prof. Wittern, Dr. Schmidt-Lewerkühne, Prof. Windhab, R. Brummer, Prof. Kulicke.

Figure 10 (right below): Prof. Böttger and R. Brummer.

He presented many interesting examples to show everywhere that rheology plays an important and even decisive role.

The president of the DGK, Dr. Schmit-Lewerkühne, delivered greetings from the DGK. He once again stressed that the scientific expertise and the international network associated with this are invaluable not only for Beiersdorf AG but also for the DGK, which can profit from the Rheology Workshops under the direction of Rüdiger Brummer. Prof. W.-Michael Kulicke from the University of Hamburg reported on cooperation between the university and industry, which can always be fruitful for both sides if it is based on trust. He thanked both Beiersdorf for funding and staff as well as the University for its support. He, too, highlighted the scientific expertise of Rüdiger Brummer by presenting the areas where he has been involved in basic research. From simple polymers to adhesives and even emulsions, this work found its culmination in a book published by the Springer Verlag "Rheology Essentials of Cosmetic and Food Emulsions".

The evening ended on a musical note, with Gottfried Böttger playing the song: "An de Eck steiht'n Jung mit'n Tüddelband". Rüdiger Brummer thanked all the speakers, the audience, his staff without whom he would not have achieved this, and Beiersdorf AG and especially Prof. Wittern, who has always had a fable for analytics, and he invited the guests to a reception in the foyer of the auditorium.

Anton Wittersheim (DGK)
Rüdiger Brummer (Beiersdorf AG)

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