International Workshop Dispersion Analysis

Berlin, Germany
March 17, 2011

The "International Workshop Dispersion Analysis" was held on March 17, 2011 in Berlin-Adlershof/Germany. The event was organized and sponsored by LUM GmbH, a leading producer of innovative instruments for direct and fast stability analysis and particle characterization of dispersions. The event was addressed to users from all kinds of industry as well as scientists. All have in common they are formulating and applying dispersions. Prof. Dr. Dietmar Lerche, Chair of the Scientific Committee and Managing Director of LUM GmbH, launched the event with an introduction about the genesis of the workshop, which had its first run in 2004 and warmly welcomed more than 66 participants from over 10 countries. He also introduced himself as a member of ISO/TC24/SC4/working group 16 ("Characterization of particle dispersions and liquids") and invited the participants to take part in the standardization process to share the 'choice of future developments' in the field.

The first lecture was given by John Tobin, from the Irish Agriculture and Food Development Authority. Tobin talked about two dispersed sys-

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Conny Roedel from the IKTS Dresden, Germany, spoke about concentrated dispersion analysis in ceramic processing. He identified the focal point of research of his department as the analysis of complex interactions between different additives and powder surfaces. Roedel then presented examinations of qualitative and quantitative effects of commercial available additives (dispersant, binder, lubricant) on the properties of alumina suspensions, which were obtained using direct and accelerated stability measurement. This method provides more comprehensive results in contrast to zeta-potential measurement. The LUMiSizer® results are subject to a publication in a peer-review journal by Roedel et al.

After intensive discussions during lunch break Maksym Loginov, who presented a teamwork of scientists from Compiègne University of Technology, France and the Institute of Biocolloidal Chemistry, Kiev/Ukraine, posed the question "Can we use the LUMiSizer® to estimate filterability of concentrated suspensions?" They examined the use of analytical centrifugation for evaluation of compression-permeability properties of concentrated bentonite and calcium carbonate suspensions. Classical methods for analysis are dead-end filtration and compression-permeability cells but they only allow one sample at a time whereas the LUMiSizer® can process up to 12 samples. Two methods for the evaluation were proposed based on the analysis of experimental data the dependence of the sample height on the centrifugation time and the dependence of the ultimate sample height on centrifugal acceleration. The values of specific cake resistance estimated from centrifugal consolidation for both suspension types agreed with the values estimated from dead-end filtration tests (especially, in the low pressure region p < 20 kPa). This opens a new application field for LUMiFuge® and LUMiSizer® the prediction of dispersion filterability. Questions whether the technique would also work with highly deformable biomaterials were posted from the audience.

Next came Dr. Peter Prochnow from ACMOS Chemie, Germany, who gave a short introduction on his company's background and line of products, namely release agents made of waxes, silicones, soaps and greases for all kinds of application areas like food or automotive industry. Prochnow then proceeded to show hands-on examples of ACMOS's quality control (using the LUMiSizer®) with the goal to determine stability of dispersions, stability of emulsions and controlling of raw materials. Prochnow explained further how important the fast and easy characterization of their dispersions is, firstly due to the 8500 tons of products per annum using 600 different raw materials, secondly due to a most broad spectrum of customers, which range from steering wheel suppliers to kitchen utensil ones. He singled out the oil-processing industry as example for their successful steady and reliable quality control by means of a LUMiSizer® and stressed that worse stability of the release agent can cause a precipitation in the annual piping which means high investment increases. Many questions followed this lecture, no doubt because a lot of attendants also work in quality control. One question was whether ACMOS has developed a standard method to measure release force to which Prochnow replied that release force is not as important as material surface composition. This is due to the fact that ACMOS changes materials all the time, so a steady check becomes a necessity.

The following speaker also came from a hands-on application background: Joao Ricardo from Ydreams, Portugal, a global company dealing with proprietary technologies such as augmented reality and others (think of interactive display technologies that can be applied on virtually any object or surface, like hologram effects on a bottle) spoke about stability of ink-jet inks. The use of the LUMiSizer® was considered because sedimentation velocity values can be measured at specific accelerations, which enabled the analysts to make a comparative study between many different inks and differentiate between formulations of the same ink. They developed a protocol for a low stability measurement at RCF = 13 (1.56 μm/s is the compromise between low stability but acceptable printability) and a protocol for high stability at RCF = 2300 (with a desired 0.0006 μm/s, whereas today's best ink is levelled at 0.0022 μm/s). The different inks can now be tested at different accelerations without having to run time-consuming measurements at gravity. Showing the different measurement profiles Ricardo illustrated how it was possible to evaluate with regards to high and low stability to establish a ranking of formulations' stability and finally to allow production decisions based on stability results.

Last but not least, PD Dr.-Ing. habil. Michael Stintz, member of the research group mechanical process engineering from Technical University

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Dresden and chairman of the German Standardization Committee (DIN) on "Particle Characterization" talked about the standardisation work of the ISO/TC 24/SC4 "Particle Characterisation" and especially about the new working group 16 "Characterization of particle dispersions and liquids" that addresses the characterisation of stability of dispersions like suspensions, emulsions, and mixtures of each other first steps towards the standardization of stability behaviour of dispersions. Stintz explained that stability is defined in terms of the change in one or more physical properties of the state of a dispersion, characterized by its homogeneity of required properties within the entire product, over a given time period. Stability may be either determined by direct methods in real time or predicted by correlative methods. The shelf life may be estimated based on the observed rate of the change of the dispersion state and the user demanded specifications for the product. Guidelines will be given for choosing relevant methods that can be used for ranking as well as quality control and/or quantification of specific destabilisation mechanisms and redispersibility. In addition, Stintz hinted at a set of standardisation projects for nanomaterials.

All released workshop papers are available for free download from the information portal www.dispersion-letters.com. The 2011 International Workshop on Dispersion Stability was considered a big success and motivated by attendees inquiry the next workshop will be organized in Berlin during March 1 – 2, 2012.

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