IUPAC Subcommittee

„Structure and Properties of Commercial Polymers“

Research Meeting No. 71
50th Anniversary Meeting

Hosted by Prof. Clive Bucknall (Cranfield University)
in
Society of Chemical Industry (SCI), London, UK

April 8-10, 2013

Chairman: Dr. Dick J. Dijkstra, Bayer MaterialScience, Germany
Secretary: Dr. Wim Zoetelief, DSM Ahead, The Netherlands

Participants: 17 participants from 8 countries

1. Prof. Altstädt, Volker - University of Bayreuth, Germany
2. Dr. Auhl, Dietmar - Maastricht University, The Netherlands
3. Dr. Bailey, Rob - Winton Material Science, United Kingdom
4. Prof. Buback, Michael - University of Göttingen, Germany
   (President IUPAC Polymer Division)
5. Prof. Bucknall, Clive - Cranfield University, United Kingdom
6. Prof. Buckley, Paul - University of Oxford, United Kingdom
7. Dr. Chai, Choon - Ineos, Belgium
8. Prof. Chan, Chi Ming - Hong Kong Univ. of Science and Techn., Hong Kong
9. Dr. Dijkstra, Dick - Bayer MaterialScience AG, Germany
10. Dr. Goeglein, Christoph - Lanxess, Germany
11. Prof. He, Jiasong - Chinese Academy of Sciences, Beijing, China
12. Prof. Laun, Martin - BASF, Germany
13. Prof. Liu, Chenyang - Chinese Academy of Sciences, Beijing, China
14. Prof. Michler, Goerg - Martin Luther University, Halle-Wittenberg, Germany
15. Dr. Slouf, Mirek - Institute of Macromolecular Chemistry, Czech Republic
16. Prof. Takigawa, Toshikazu - Kyoto University, Japan
17. Dr. Zoetelief, Wim - DSM Research, The Netherlands

From 9 members we have received their apologies.

The updated status of the membership, projects, feasibility studies, proposals and new proposals can now be seen on the subcommittee’s web page (designed and maintained by Philip Putson, putson@clara.co.uk): http://www.putson.com/Iupac. Every member is urged
to study and update his part of the SC internet site. In case of problems accessing the private section of the website, please contact the secretary. These minutes compile the action points for the individual participants and summarises the most important new information. More detailed information on the status quo of the projects and feasibility studies can be found on the SC internet site.

**Completed projects**

1. (IUPAC No. 1999-020-1-400) Quantifying scratch resistance of commercial polymers.
   Task Group Leader: Dr Rob Bailey, ICI Measurement Science Group, United Kingdom
   Project is completed although final paper is not finished. It is decided to publish the available data on the web.

2. (IUPAC No. 2003-009-1-400) Recommendations for data presentation applicable to mechanical and rheological measurements of polymers.
   Task Group Leader: Dr. Erik Wassner, BASF SE, Germany
   Project is completed. TA-Instruments implemented XML-format in their new TRIOS-software. Wassner will be asked to write a short summary of status. All SC-members are asked to follow the recommendations for data-exchange!

   Task Group Leader: Prof. Jiasong He, Chinese Academy of Sciences, Beijing China
   **He:** Project is completed. One paper is published: Qinyong Mi, Xiaocheng Zhang, Jiasong He, "Rheological hybrid effect in dually filled polycarbonate melt containing liquid crystalline polymer". Polym. Eng. & Sc., 52(2), 289 (2012)

We have now 5 running official IUPAC projects:

   Task Group Leader: Dr. Helge Steininger, BASF SE, Germany
   Not discussed during this meeting

2. (IUPAC No. 2007-004-1-400) Guidelines for shear rheometer calibration and performance check
   Task Group Leader: Dr. Ullrich Handge, Helmholtz-Zentrum Geesthacht, Germany
   Laun has finished writing the manuscript and will transfer it to Handge for finalizing. The paper will be submitted for publication in PAC. Perhaps a shorter version could be submitted to Applied Rheology.

3. (IUPAC No. 2008-028-1-400) Elongational rheometry devices for shear rheometers
   Task Group Leader: Dr. Dietmar Auhl, Maastricht University, The Netherlands
   Handge and Vittorias have started writing a draft paper for publication in PAC which is expected to be finished next year. Up to now, 10 participants have asked for samples, 5-6 have returned their results yet. Task leader will push members to send in their contributions.
4  (IUPAC No. 2010-019-1-400) Characterization, rheology and mechanical properties of high and ultra-high molecular weight polyethylene
Task Group Leader: Prof. Clive Bucknall
Project is well underway. Proposal to write 3 papers: 1\textsuperscript{st} on molecular weight determination (first draft is awaiting comments from other members), 2\textsuperscript{nd} on the characterization of defects, i.e. crystallinity and crystallization, 3\textsuperscript{rd} on fracture and wear behavior. For the latter experimental results are highly appreciated. Molecular characterization is a point of concern, since various methods seem to give inconsistent results. Results of mechanical tests and a detailed morphological study were presented by Buckley and Michler, respectively.

5  (IUPAC No. 2010-029-3-400) Relation between rheological properties and foam processability for polypropylene.
Task Group Leader: Prof. M. Yamaguchi, JAIST, Japan
Not discussed during this meeting.

Feasibility Projects pending for approval

There are no Feasibility Projects at the moments that awaiting approval.

New and running feasibility studies:

1  Wassner: Rheology of foaming (Feasibility Study No. 15).
Participants: Mangus, Auhl, Dijkstra, Handge
No change in the situation with the availability of the MultiPass Rheometers, so it remains dormant.

2  Wassner: Comparison of different CABER devices. (Feasibility Study No. 16)
Participants: Dijkstra, Mangnus, Brummer, Clasen, Zoetelief
No activity for this study. Therefor it is decided to remove it from the list.

3  Mangnus: Comparison between experiment and simulation of extrudate swell (Feasibility Study No. 9).
Participants: Auhl, Vittorias, Handge, Kroll, Zoetelief, Remerie, Slouf
Objective is to develop a representative methodology to measure extrudate swell for polymer melts. There is still interest in this topic, e.g. by Chai, Zoetelief, Mangnus, Laun, Auhl and Remerie. Proposal: organize a workshop to get this study started.

4  Dijkstra: Mechanical and rheological studies during drying of a disperse system. (Feasibility study No. 17)
Participants: Slouf, Auhl
No samples are selected yet. Scope should be redefined. Slouf is interested to apply the wet-SEM technique on the samples.

5  Maeda: Interfacial and adhesive properties of polyamide elastomers. (Feasibility study No. ??)
Participants: Y. Men, C.Y. Liu, S.H. Kim
It turned out that the selected samples cannot be exported to China, since the material is not registered. Therefor it is decided to stop this feasibility study.
New proposals for feasibility studies:

1 Steiniger: Continuous fibre composites containing Carbon Nano Tubes (CNT)
This idea is put forward in line with the wish to have a fracture mechanics study running. As the composites using CNT are difficult to process, it is suggested to use SiO₂ instead. Since there is still interest, it is proposed that a smaller group of members will discuss this topic in more detail to specify the scope more clearly.

2 Nowak: Morphology induced structure formation determined by LAOS (FT-rheology)
Maik Nowak introduced a problem with respect to the relation between morphology induced structure formation and non-linear rheology. It was tried to investigate the structure formation using non-linear rheology by applying Large Amplitude Oscillary Shear (LAOS) or Fourier-Transform (FT) rheology, but the results were not fully understood. Selected samples of Ecoflex and Ecovio materials are distributed amongst interested members. First results were presented, e.g. rheology, morphology and thermal characterization. However, it is still not clear whether this a feasibility study yet. It is time to decide how to proceed from here and what to do with the available results.

3 Auhl: Comparison of modulated DSC, Flash DSC and TOPEM.
Dietmar presented an overview of new thermal characterization techniques. Aim of the study could be to show the applicability of the various methods and their limitations rather than showing all the possibilities. There is enough interest, so it can be a feasibility study. Samples have to be selected, however. Suggested Task group leader is Dietmar with Christoph as co-coordinator.

4 Dijkstra, Bailey, Laun: Update of the SC history.
Update the paper on the history of our SC by adding the past 10 years.

Report from the EA research meeting 70A Jeju, Korea (Nov. 23rd 2012):

The EA research meeting 70A was hosted by Prof. Doo Sung Lee, Sungkyunkwan University (Korea). Prof. Takigawa reported briefly the minutes of the meeting (see website for full version of these minutes). This meeting was well attended by 17 participants. Three new members were welcomed and 3 members retired, which brings the total at 36 members. Past year two new papers were published. The feasibility project proposed last year by Dr. Maeda has stopped due to problems with the distribution of samples. Two running projects were discussed in more detail, i.e. the project on foam processability of PP and the UH-project. Prof. Takigawa proposed a new feasibility study on the rheology of polysaccharides. Next meeting will take place in Japan and will be hosted by Dr. Maeda from UBE Industries. The tentative date is Nov. 12th.

Report Polymer Division Meeting (Roanoke, VA, USA) by Prof. He

Prof. He represented our SC at the Polymer Division meeting. The overview of the activities in the SC were presented. The Division was impressed by the activeness of our SC and liked the mix between academia and industry.
Membership:

We welcomed 1 observing members during this meeting: Christoph Goeglein is replacing Jochen Kroll (Lanxess). He enjoyed the discussions and the open atmosphere during the meeting and hoped he is able to join next year.

Everybody is invited to actively help looking for new members, especially in the field of (polymer) mechanics. Possibly we should extent our activities to thermal analysis as well by inviting colleagues/specialist in this field.

Matters arising:

Jubilee meeting: In this special meeting for the occasion of the SC’s 50th anniversary, Prof. Michael Buback, president of the IUPAC Polymer Division, joined the meeting to celebrate this with us.

Wikipedia page of SC: Dietmar made a first draft, but after uploading it was not accepted since it was lacking reliable resources (?). Since we are a notable organisation, it should be figured out how the page can be accepted by the reviewers.

Presentations:
We valued the interesting presentations of Prof. Buback who gave an overview of the IUPAC organisation and of Prof. Buckley about the mechanical performance of glassy polymers.

Next meetings

Volker Altstädt offered to host the next meeting in Bayreuth, Germany. Preliminary date: Mid-April. Mirek Slouf will look for options to organize the 2015 meeting in Prague.

Action points:

1 Minutes of the SC meeting will, supplementary to the web site, also be send by email. by: Secretary
2 Members not showing up at meetings for more than 3 years will be contacted (by email or letter) by: Secretary
3 For each new feasibility study, new potential contributors should be named or contacted. by: All
4 Web page will be updated; Presented graphs will be up-loaded to the web site. by: All
5 Changes in address, affiliation, etc, should be updated on our website by: All
6 Task leaders will be asked to update their projects on the website by: Task leaders
Participants of the 71th Subcommittee Meeting in London, April 8-10 2013
(In the London Eye, from left to right: Paul Buckley, Toshikazu Takigawa, Dietmar Auhl, Wim Zoetelief, Chenyang Liu, Jiasong He, Clive Bucknall, Michael Buback, Choon Chai, Dick Dijkstra, Rob Bailey, Martin Laun, Mirek Slouf, Christoph Goergelein)