

IUPAC POLYMER DIVISION MEETING
General Assembly
August 08 – 09, 2015
09:00–17:30
09:00–12:30
BEXCO, Busan, South Korea

Those attending: Rameshwar **Adhikari** (Nepal) NR, Mansor **Ahmad** (Malaysia) observer, Jan **Apotheker** (Netherlands) guest (CCE), Netra Lan **Bhandari** (Nepal) observer, Chin Han **Chan** (Malaysia) NR, H. N. **Cheng** (USA) guest, Kedar Natm **Dhakal** (Nepal) observer, Christopher **Fellows** (Australia) observer, Dannibelle **Haase** (USA) observer, Jiasong **He** (China) TM, Michael **Hess** – Division Secretary (Germany), Roger **Hiorns** (France) TM, Voravee **Hoven** (Thailand) NR, Jung-Il **Jin** (Korea), Do-sung **Lee** (Korea) NR, Christine **Luscombe** Division Vice-President elect (USA) SPT, Mario **Malinconico** (Italy) observer, Graeme **Moad** (Australia) TM, Werner **Mormann** (Germany) TM, Tamaki **Nakano** (Japan) SPT, Christopher **Ober** – Division Past President (USA), Rasjesh **Pandit** (Nepal) observer, Greg **Russell** – Division Acting President (New Zealand), Mitsuo **Sawamoto** (Japan) TM, Stanislaw **Slomkowski** (Poland) SPT, Jaroslav **Stejskal** (Czech Republic), Natalie **Stingelin** (UK) SPT, Dhruba **Subedi** (Nepal) observer, Supavan **Tantayanon** (Thailand) observer, Patrick **Theato** (Germany) observer, Paul **Topham** (UK) observer, Miroslava **Trchová** (Czech Republic), Nick **Tsarevsky** (USA) observer, Cem **Tuncel** (Turkey) observer, Jiri **Vohlidal** (Czech Republic) NR, Yusuf **Yagci** (Turkey) TM

Saturday, 08.08.2015

1. Acting President's Introductory Remarks and Finalization of the Agenda

The Acting President Greg Russell welcomed the Division members, observers and guests. The previously distributed agenda was accepted, in-process changes applied –see Appendix 1. Greg Russell welcomed in particular IUPAC Young Observers: Nicolay (Nick) Tsarevsky (Bulgaria), currently at Southern Methodist University, Dallas; Paul Topham (UK), Aston University, Birmingham; Dannibelle Haase (USA), Dow Chemical Company; Mansor B. Ahmed (Malaysia), University Putra Malaysia, Serdang and the other first-timers: Chris Fellows (Australia), University of New England, Armidale; Patrick Théato (Germany), Universität Hamburg.

2. Apologies for Absence

Absent members sent their apologies together with greetings to the Division, namely Michael Buback, Sabine Beuermann, Bernadette Charleux, Phil Hodge, Robin Hutchinson, Dick Jones, Pavel Kratochvil, Igor Lacik, Claudio dos Santos, Malcolm Purbrick, Michel Vert, Jean-Pierre Vairon, Bob Stepto¹ and Michael Walter.

Greg Russell explained the absence of the actual Division President Michael Buback, which is caused by private reasons.

3. Approval of the Minutes of the Division Committee Meeting, Istanbul, August 2013

The minutes recorded from the 2014 meeting in Chiang Mai, Thailand, were accepted without any dissenting vote.

4. Report Interdivisional Subcommittee Materials Chemistry (ISMC) (Chris Ober)

The ISMC was founded by Divisions I, II, and IV because of the increasing importance of materials science in chemistry. Its purpose is to identify projects of common interest among the founding Divisions. The goal of the first Chair – Len Interrante (Division II) – was to investigate the potential of a new group (interdivisional subcommittee) within IUPAC responsible for aspects of materials chemistry. The goal was to investigate potential of a new entity responsible for materials chemistry with its own budget and as a result this interdivisional subcommittee (ISMC) was created, and Chris Ober became its second chair. There is presently no budget but project based applications for funding can be submitted to the projects committee.

Chris Ober, the current chair of ISMC, reported about the last meeting of the ISMC on the occasion of the ACS Meeting in San Francisco, fall 2014. The organizers of the World Chemistry Congress Busan 2015 were asked to consider a more diverse and representative team of speakers for the World Chemistry Congress. After about 1 year of being frozen, the IUPAC website is about to be up-dated and the corresponding ISMC website has to move on. Further Divisions should be encouraged to join ISMC. For this purpose it was considered to send copies of the activity reports to all Division Presidents. Also, young observers should be invited to the meetings and encouraged to contribute. The coming meeting

¹ Note added in proofreading: the Division is deeply saddened by the subsequent and unexpected passing of Bob Stepto on 13 September 2015, soon after our Busan meeting. Our great friend and colleague Bob will be keenly missed.

of ISMC during the Busan GA will also discuss the centenary of IUPAC in Paris in 2019. Besides celebrating this remarkable anniversary, goals are to excite public about chemistry's contribution to society and to better reach the developing world. The event should also be used to grow IUPAC's resources. A report of the meeting will be published on the ISMC website.

Presently, there is one project, namely #2013-037-1-200, a special project with modest contributions by the Divisions. A 'dummy' website is set up by Ilya Zharov, displaying areas where materials chemistry is significant and educational material will be incorporated. There is no overlap with the Division IV educational website.

Potential future projects are interdivisional activities including materials chemistry of energy, sustainability, health, nanotechnology etc. Since materials chemistry overlaps with organic-inorganic chemistry and life science, new methods of characterization are required, nanotechnology, terminology, education, conference and further subjects yet to be identified. Workshops and conference programming on materials chemistry have to be considered for the World Chemistry Congress in Sao Paulo, Brazil 2017.

Chris Ober gave a report on the ISMC Meeting at the ACS Fall Meeting, San Francisco (2014). The Korean Organizers of the IUPAC World Chemistry Congress, Busan (2015) were contacted to arrange a more diverse and representative set of speakers for 47th IUPAC World Chemistry Congress.

Chris Ober is now in charge of ISMC for a second year and he is ready to carry on until the GA 2017, however, he strongly suggests a rotation of the Chair among the founding Divisions. The next meeting will be at the presently held IUPAC GA after the Division IV meeting. Natalie Stingelin will become a Div. IV representative on ISMC. The development of the ISMC website will be carried on and participation of more Divisions is desired. The ISMC will more actively report about its activities to the Divisions, and young observers will be invited to future meetings for fresh ideas.

5. Report on the Wikipedia Project (Michael Hess)

Wikipedia has become a *de facto* tool for learning information about many scientific and technical fields. In a first, now finished project (2011-013-2-400), we successfully demonstrated how to synchronize Wikipedia and IUPAC documents (M. Walker and M. Hess, *Chem. Int.*, March-April 2014, 19). In a **new, follow-up project**, which builds upon the prior experience, there are new and different objectives, which are listed below.

Stakeholders include practicing scientists, who need good definitions for polymer terminology in an easily accessible manner, educators and students of all age groups who are looking for resources, and the general public who are looking for help in understanding technical issues. Given the broad reach of Wikipedia, this will also provide tools to the developing world in ways that most IUPAC efforts cannot.

Educational aspects: It is expected that students of the team members will be employed on short periods to work on the project. They will gain through understanding how IUPAC and Wikipedia work, and by having excellent experience on their CVs of working in academic environments, in a supervised manner, and of interfacing with the general public. There will be improved Wikipedia entries and new entries based on existing IUPAC documents. Incomplete Wikipedia entries ('stubs') will be checked and completed where possible. Finally, we will link from the Polymer Education website to the Wikipedia pages and *vice versa*.

The project entails the incorporation into Wikipedia of IUPAC approved terminology related to polymer chemistry. This is a very timely project because of the growing importance of sources such as Wikipedia in everyday use as a replacement for glossaries, reference books and dictionaries. In the first corresponding project (2011-013-2-400) we tested ways suited to accept IUPAC contributions to Wikipedia (M. Walker, M. Hess, *Chem. Int.*, April/March, 2014, 19). Based on these very successful experiences it is clear that a new project will have an empowering effect on numerous communities throughout the world ranging from academia, schools, industry and the general public. The elaborated objectives have been constructed with this in mind. The tasks tied to each objective will be as follows:

1. Check Wikipedia polymer-relevant entries against existing Division IV Terminology & Nomenclature documents (specifically starting with the Purple Book, and then working through the more recent publications by the Subcommittee on Polymer Terminology) for consistency and take appropriate action where required. Furthermore, in addition to creating links to relevant *Pure Appl. Chem.* references, links to and from the Division's educational website will be made.
2. Identify Division IV terms from documents that should contribute a Wikipedia entry and prepare such an entry. In rare cases, it will be necessary to transcribe the whole document to Wikipedia, as per the example of the IUPAC Brief Guide to Polymer Nomenclature, now on Wikipedia.
3. Check incomplete Wikipedia entries, so-called 'stubs' http://en.wikipedia.org/wiki/Category:Polymer_stubs and provide a complete entry.
4. All new IUPAC documents will be checked by the Task Group for linking with Wikipedia and/or creation of a corresponding new Wikipedia entry. A guideline in which cases of doing that will be prepared and offered to the Division(s), so that others may see how it is done. Wikipedia also raises the interesting question of graphics and even videos. We will also work to establish recommendations for such new media, as both material for addition to

Wikipedia and for IUPAC in general to consider as part of its own website(s) and as part of an educational program within this project.

5. The statistics of (some selected) Wikipedia entries (preferably those written by IUPAC members and new ones) will be monitored.

Each of the above tasks will be carried out in the following specific manner, respectively:

Task 1: There will be an active participation of students as 'scouts' who will identify corresponding entries under the supervision of the Task Group Members. The motivation for this is that each student will learn, as part of an educational program, how to: access and employ IUPAC recommendations in a world-wide context; edit Wikipedia; use electronic communication effectively for educational purposes; and gain an overview of Wikipedia editing tools. There should be a significant budget provided to support these students. Their work can be seen as **part of an educational program**. They will also identify polymer-relevant Wikipedia entries where there is no IUPAC definition available.

Task 2: Can also in parts be dealt with by students. This task requires much more supervision, however experienced students can be helpful in the formalities and editing that is required when placing or modifying a Wikipedia entry.

Task 3: Here the cooperation of the whole Division is required in order to deal with the problem of incomplete Wikipedia entries. A concept has to be developed for how to deal with Wikipedia entries with no corresponding IUPAC entries.

Task 4: All Division IV working parties are asked to contribute to this point. For the aspect of including new media, again the assistance of capable students will be required.

Task 5: The number of hits on the websites should give a representative measure of the impact of the IUPAC documents adapted to Wikipedia customs. Otherwise, there is practically no measure of IUPAC terminology and nomenclature documents since the common citation index is of little use. <http://stats.grok.se/>

6. Report Subcommittee Polymer Terminology - SPT (Roger Hiorns)

SPT defines terms and nomenclature (on behalf of Division VIII) in polymer science. Polymer science represents about 40% of the world's chemistry economy with a significant economic, scientific and educational impact. The importance of this work can be deduced from a comment of a director of chemical patents of a major multinational company: "In the drafting, prosecution and litigation of chemistry patents we are grateful if we can rely on exact nomenclature and definitions as provided by IUPAC, as this helps us to define the claimed scope of protection more precisely. In patent law, clear and concise claims are also an important requirement for a patent to be valid. So your work is much appreciated."

Publications since the SPT-meeting Chiang Mai, Thailand 2014:

2005-005-2-400 Solutions – Stepto

Published as, 'Definitions of terms relating to individual macromolecules, macromolecular assemblies, polymer solutions, and amorphous bulk polymers (IUPAC Recommendations 2014)', R. Stepto, T. Chang, P. Kratochvil, M. Hess, K. Horie, T. Sato, J. Vohlidal, *Pure Appl. Chem.* 2015; 87(1): 71–120.

1999-051-1-800 Modified – Jones

Published as, 'Nomenclature and graphic representations for chemically modified polymers (IUPAC Recommendations 2014)', R. G. Jones, T. Kitayama, E. S. Wilks, R. B. Fox, A. Fradet, K.-H. Hellwich, M. Hess, P. Hodge, K. Horie, J. Kahovec, P. Kratochvil, P. Kubisa, E. Maréchal, W. Mormann, C. K. Ober, R. F. T. Stepto, M. Vert, J. Vohlidal, *Pure Appl. Chem.* 2015; 87(3): 307–319.

2011-013-2-400 Updating Wikipedia – Hess

Published through numerous Wikipedia pages now carrying IUPAC definitions.

2007-008-1-400 Multilingual Encyclopaedia – dos Santos

Published as a Multilingual Polymer Glossary at:

<http://www.iceb.ufop.br/dequi/iupac/polymerglossary/index.php>

Purple Book (PB2) was made freely available at:

http://www.iupac.org/fileadmin/user_upload/publications/e-resources/ONLINE-IUPAC-PB2-Online-June2014.pdf

Projects submitted to ICTNS & public review

2003-042-1-800 Source-based nomenclature of single-strand organic polymers and copolymers – Jones

Projects close to completion

2001-081-1-800 Terminology and Structure-Based Nomenclature of Dendritic and Hyperbranched Polymers – Fradet

2003-060-2-400 Terminology on separation of macromolecules – Hess

2006-028-1-400 Terminology for Conducting, Electroactive and Field-responsive Polymers – Vohlidal

2008-015-1-400 Preferred Names of Polymers – Mormann

2008-020-1-400 Revision of the Division IV Web-based Terminology Guidelines – Hodge

2009-047-1-400 Stereochemical Aspects in Polymer Science – Hellwich & Moad

2010-007-1-400 Terminology for Chain Polymerization – Moad

2010-036-1-400 List of Keywords – dos Santos & Slomkowski

2011-035-1-800 Terminology & Nomenclature of Inorganic & Coordination Polymers – Jones
(collaborative project of Divisions II, IV & VIII)

2012-001-1-400 Terminology of Nanomaterials and Nanotechnology in Polymer Science – Ober & Jones

2012-042-1-400 Terminology Relevant to Lactic Acid-based Polymers: Synthesis, Structure, Properties, Applications & Degradation – Vert

2013-027-3-400 Enhancing Educational Website for Polymer Chemistry – Ober

2013-048-3-400 A Brief Guide to Polymer Terminology (Brief Terms) – Hiorns, Vohlřdal

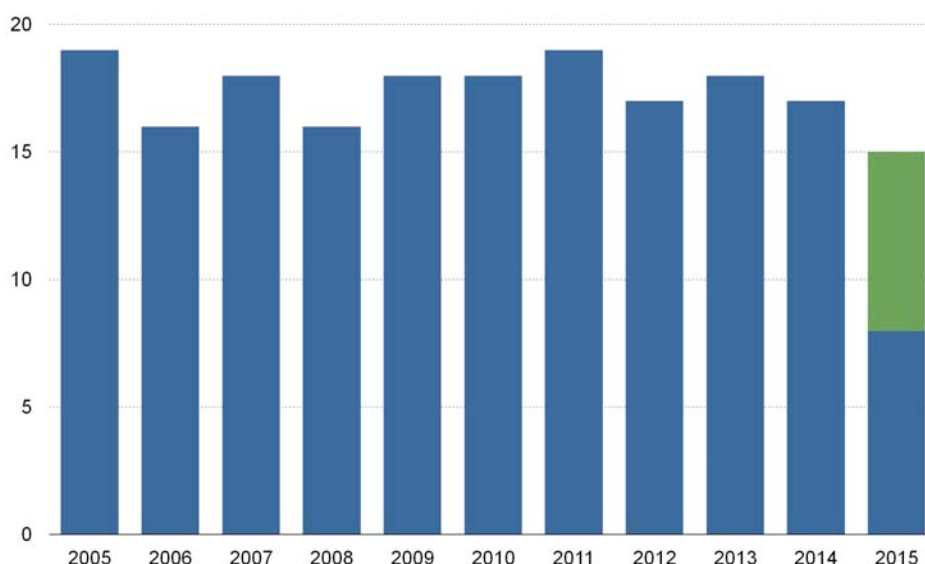
2013-031-2-800 Structure-based Nomenclature for Regular Star and Brush Polymers – Chen

2014-014-1-400 Terminology for modeling and simulation of polymers (ModSim) – Meille

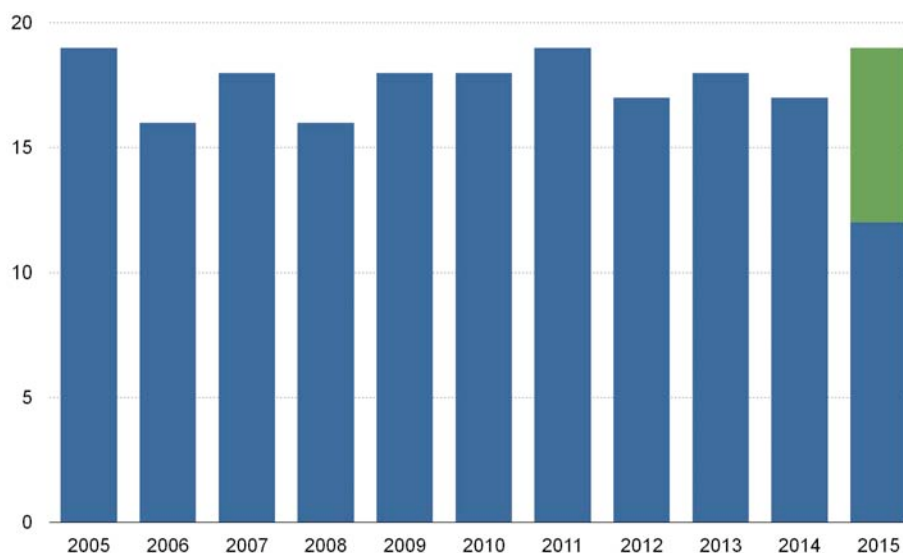
Project Situation going into 2015

Without new projects, SPT would have had only 15 projects running with 7 coming to an end within one year (average over last 10 years is 18)

Project status 2015 without new projects:



Project status 2015 with new projects:



Projects Funded

- 2014-034-2-400** (Project Committee) Nomenclature for polymeric carriers bearing chemical entities with specific activities and names – **Vert**
- 2014-033-1-400** (Extension of 2012-042-1-400) Nomenclature and terminology relevant to lactic acid-based polymers: synthesis, structure, properties, applications and degradation – **Vert**
- 2015-013-1-400** Brief Guide to Polymerization Terminology – **Luscombe**
- 2015-014-1-400** Guide (and Brief Guide) to Polymer Semiconductors – **Walter**

Projects recently submitted for funding

- 2015-012-1** (Project Committee) Terminology of Tissue Engineering and Regenerative Medicine in Polymer Science – **Purbrick**

Projects close to submission for funding:

Project Committee

- Updating Wikipedia: Synchronizing Polymer Definitions and Terminology – **Hess**
- Multilingual Glossary of Polymer Terminology: Stage II - Non Western Languages – **dos Santos**

Polymer Division

- 2013-050-1-400** Definition of Terms Relating to the Ultimate Mechanical Properties of Polymers - **Adhikari**
- Guide to the Characterisation of Polymers – **Hess**
- Brief Guide to Polymer Microstructure – **Stingelin**

Mid- to long-term project ideas

http of PB2 – **Moad**

Renewable and recycled polymers – **Vairon**

Terminology for constitutionally-dynamic polymers – **Vohlidal**

Polymers for Bioelectronics – **Walter**

Polymers for 3D printing – **Walter**

Ionic liquids/polymer inorganic devices – **Ober**

Mediatized terms – **dos Santos**

Modified extended short hand names – **Vert**

Adhesion, adhesive polymers and associated terminologies – **Vairon**

Evaluation of polymer crystals – **Meille**

The SPT Bureau has been established and now is active. It is of purely administrative nature and its purpose is to advise the Chair of SPT, provide higher administrative efficiency, support projects through the administration process, forward electronic methodologies of SPT-communication/memory, and help to organize the agenda of meetings. Note there is no deliberation on nomenclature or terminology. The members of this bureau are Roger Hiorns (ex officio), Christine Luscombe (ex officio), Claudio dos Santos, Greg Russell and Jiri Vohlidal.

The communication platform (library and file exchange) ‘redmine’ has been activated: <https://redmine.univ-pau.fr>

For instructions on use, see http://www.iupac.org/fileadmin/user_upload/divisions/IV/401/IV1_14min.pdf

7. Report Subcommittee Structure and Properties of Commercial Polymers - SPCP (Jiasong He)

The Subcommittee has two co-chairs, namely Dr. Iakovos Vittorias (Germany) and Jiasong He (China), with Dr. Chang-Sik Ha (South Korea) as the chair of East Asian Research Meeting. It consists of 68 members from 12 countries (27 are from industry, 41 from academia) subdivided into Asian and European Sections, which makes meetings less expensive. The 72A-meeting of the East Asian Research group was held in Luoyang (China), November 19/20, 2014, hosted by Jiasong He. There were 20 participants from 3 countries (academia 15, industry 5). The 73rd Subcommittee meeting was held in Prague (Czech Republic), April 22-24, 2015, hosted by Dr. Slouf, with 27 participants from 8 countries (academia 17, industry 10).

Recent publications are [number refers to publication since formation of the SC just over 50 years ago]:

[91] K. Wang, F. Wu, W. Zhai*, W. Zheng, *Effect of Polytetrafluoroethylene on the Foaming Behaviors of Linear Polypropylene in Continuous Extrusion*, *J. Appl. Polym. Sci.*, 129: 4 (2013).

[92] M. Laun, D. Auhl, R. Brummer, Dirk J. Dijkstra, C. Gabriel, M. A. Mangnus, M. Rüllmann, W. Zoetelief, U. A. Handge*, *Guidelines for checking performance and verifying accuracy of rotational rheometers: viscosity measurements in steady and oscillatory shear* (IUPAC Technical Report), *Pure Appl. Chem.*, 86: 1945–1968 (2014).

Two projects were finished since the last Division meeting, namely:

2010-029-3-400 *Relation between rheological properties and foam processability for polypropylene*

Task Group Leader: Prof. M. Yamaguchi, JAIST, Japan

2005-023-2-400 *Microstructural, melt processing and mechanical properties of compatibilised PA6/ABS Blends*, Task

Group Leader: Dr. Helge Steininger, BASF SE, Germany

Currently active projects:

2007-004-1-400 *Guidelines for shear rheometer calibration and performance check*

Task Group Leader: Dr. Ulrich Handge, Helmholtz-Zentrum Geesthacht, Germany

One paper has been published: *Pure Appl. Chem.*, 86: 1945–1968 (2014).

2008-028-1-

400 *Elongational rheometry devices for shear rheometers* Task Group Leader: Dr Dietmar Auhl, Maastricht University, The Netherlands

Dietmar, Iakovos and Ulrich have started writing a paper: to be submitted to *Macromolecules*

Project will be extended to 2015.

2010-019-1-400 *Characterization, rheology and mechanical properties of high and ultra-high molecular weight polyethylene*

Task Group Leader: Prof Clive Bucknall, Cranfield University, United Kingdom

Many results were presented during April meeting.

Has been running for 4 years. Planned to extend to December 2015.

Five publications are planned to finalize the project:

- PAC report;
- Solution and melt viscometry for molar mass analysis;
- Thermal Analysis, High-Pressure Crystallisation, Flash-DSC;
- Micromechanics (entanglement and grain boundaries), indentation, creep compared to macromechanics; Macromechanics (Crack, Yield, Wear, Fatigue, etc.).

Feasibility studies:

Feasibility Study No. 15: Rheology of foaming

Participants: Wassner, Mangus, Auhl, Dijkstra, Handge

No change in the situation with the availability of the MultiPass Rheometers, so the project remains **dormant**.

Feasibility Study No. 9: Comparison between experiment and simulation of extrudate swell

Participants: Mangnus, 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, so that the future of this study will be discussed by the proposer and his colleague.

New Proposals for Feasibility studies

- *Rheological behavior of thermoplastic polyurethane*
Dijkstra: with Wassner/Susoff, Auhl
- *Poly(lactide (PLA): Characterization of molecular structure*
He: with Altstädt, Auhl, Galeski, Ha, Hu
- *Transparent propylene/butane-1 random copolymer*
(decreased crystallinity and T_m, low extractable *n*-hexane content)
He: with Auhl
- *Anti-bacterial and anti-mildew PP resin*
He: Sinopec sample
- *New green polymer Polyketone*
Ha: with Nitta, Wang, Lee, He, Hu, Auhl, Dijkstra, Wu, Slouf
- *Deformation behavior of neck-forming polymers*
Hobeika: with Galeski, Vittorias, Nitta, Wu, He/Men, Auhl
- *Special DSC methods (RheoDSC)*
Zoetelief: with Goegelien, Piorkowska, Slouf, Vittorias, Vervoort
- *Performance of PEEK*
Wu: with M. Slouf, D. Auhl, S. Henning

Next meetings

- 2015 Subcommittee EA Meeting No. 73A
November 4- 5, Busan, Korea
Hosted by Prof. Ha
- 2016 Subcommittee Meeting No. 74
April 2016,
Rhodes or Durham 2016 (April/May or September)

Natalie Stingelin suggested addressing the application of flash DSC in future studies, as well as problems of separation/characterization with chromatography and related techniques. Due to a change of generations there is presently a lack of participants from Japan. Mitsuo Sawamoto will forward the information within the Japanese polymer community and stay in contact with Jiasong He on this issue.

8. Subcommittee Modelling of Polymerization Kinetics and Processes (Greg Russell on behalf of Sabine Beuermann)

Publications and citations up to June 22nd, 2014 and June 22nd, 2015: see **Appendix 10**.

Co-Chairs: Sabine Beuermann (Germany) and Robin Hutchinson (Canada)

Most recent past Chairs: Michael Buback (Germany) and Greg Russell (New Zealand)

The subcommittee comprises 44 members (industry 5, research institutes 3, university 36) from 16 countries. The membership needs expansion into Asia and UK.

The last meetings were held on the occasion of MACRO 2014 (Chiang Mai) and during the ACS Meeting, Fall 2014 (San Francisco).

The next meeting is scheduled for PACIFICHEM 2015 (Honolulu in December)

The activities of the Subcommittee focus on: producing **critically evaluated kinetic parameters**, whose values are reliable and which can be used by the international polymer community; and establishing **reliable methodologies**. Benchmark propagation rate coefficients, k_p , have been obtained for styrene, many methacrylates, methyl and *n*-butyl acrylate, and methacrylic acid by critical evaluation and also by independent experiments. These efforts are currently being extended to termination rate coefficients, initiation rate parameters and reversible-deactivation radical polymerization kinetics.

Running projects are:

- NMP (nitroxide – mediated polymerization) rate parameters
- Initiation rate parameters
- Styrene polymerization rate parameters
- Vinyl ester propagation
- Chain-length dependent termination

Project 2009 – 050 – 1 – 400

Critically evaluated rate coefficients associated with initiation of radical polymerization

Leader Graeme Moad

Task Group Mathieu Ahr, Sabine Beuermann, Michael Buback, Michelle Coote, Klaus-Dieter Hungenberg, Greg Russell, Manfred Stickler, Ernie Wysong

Approval Date 6 April 2010

Meetings July 2010 (at Macro 2010), December 2010 (Pacifichem),
July 2011 (IUPAC GA & C), August 2011 (ACS Meeting),
June 2012 (MACRO2012)

Objective To begin the task of providing critically evaluated (“benchmark”) data for rates of initiation in radical polymerization.

Current Status A comprehensive review on azo initiation to be published in Prog. Polym. Sci. was prepared by Graeme Moad.

Project 2010 – 027 – 2 – 400

Critically evaluated dissociation rate coefficients for alkoxyamines

Leader Yohann Guilleaume

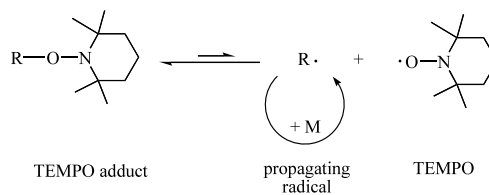
Task Group Elena Bagryanskaya, Michael Buback, Bernadette Charleux, Michelle Coote, Didier Gimes, Graeme Moad, Peter Nesvadba, Gudrun Schmidt-Naake, Armido Studer, Per Zetterlund, Shiping Zhu

Approval Date February 2011

Meetings July 2010 (Macro 2010), December 2010 (Pacifichem), August 2013 (APME, Durham)

Objective To provide critically evaluated dissociation rate coefficients for different alkoxyamines used in nitroxide-mediated polymerization. TEMPO and SG1-based compounds will be processed first. Data from different techniques (computational, NMR, ESR, liquid chromatography, etc.) will be considered. The issue of Arrhenius parameters (activation factor *A* and activation energy *E_a*) will be particularly emphasized.

The Basic Chemistry



Illustrating activation (dissociation) and deactivation for NMP:

Current Status

Gathering data for 2,2,6,6-tetramethyl-1-piperidinyloxy radical (TEMPO) and N-*tert*-butyl-N-(1-diethylphosphono-2,2-dimethylpropyl) nitroxide (SG1). Data were collected and are currently being processed; manuscript preparation started. Delay due to change in responsibilities and personal matters.

Project 2013 – 045 – 1 – 400

Critically evaluated rate coefficients for vinyl ester propagation

Leader Robin Hutchinson

Task Group Christopher Barner-Kowollik, Sabine Beuermann, Michael Buback, Thomas Junkers, Bert Klumpermann, Igor Lacík, Anatoly Nikitin, possibly more

Approval Date 01-Nov-2013

Meetings Project was started by email; MACRO 2014, Thailand; Pacifichem 2015, Hawaii.

Objective To provide benchmark values for the propagation rate coefficient in vinyl ester systems. The particular challenges associated with measuring k_p for vinyl acetate (degradative chain transfer; difficult initiation) will be addressed. The related system vinyl pivalate will also be examined.

Current Status New data were collected and compared to literature values. A manuscript is currently being prepared and will be discussed during Pacifichem 2015.

Project 2013 – 047 – 1 – 400

Critically evaluated rate coefficients for radical polymerization of styrene

Leader Sabine Beuermann

Task Group Michael Buback, Hans Heuts, Klaus-Dieter Hungenberg, Robin Hutchinson, Graeme Moad, Greg Russell, Johannes Vorholz, Per Zetterlund, Shiping Zhu

Approval Date 01-Nov-2013

Meetings Project was started by email; ACS 2014, San Francisco; Pacifichem 2015, Hawaii.

Objective To provide a complete set of rate coefficients of all elementary reactions that are relevant for modeling of polymerization processes of a well-studied monomer of high industrial importance.

Current status The rate coefficients to be included were identified. Input from O.F. Olaj as a well-experienced scientist will be asked for. Industry input for the choice of data is currently searched for.

Project 2013 – 051 – 1 – 400

Critically evaluated rate coefficients for chain-length-dependent termination in radical polymerization

Leader Greg Russell

Task group Christopher Barner-Kowollik, Sbine Beuermann, Michael Buback, Dagmar d’Hooge, Klaus-Dieter Hungenberg, Thomas Junkers, Anatoly Nikitin, Gerhard Zifferer

Approval date 01-Nov-2013

Meetings Macro 2014, Thailand; ACS 2014, San Francisco; PACIFICHEM 2015, Honolulu

Objective Critical evaluation of rate parameters for chain-length-dependent termination of styrene and n-alkyl methacrylates, leading to the provision of benchmark data for such; guidelines on the correct employment of these parameters for evaluation of (steady-state) rate and average degree of polymerization

Current status: Recent publication of styrene CLDT directly measured via SP-PLP-ESR by Buback. Data will be discussed with existing literature values

Proposal Phase

Project proposal (being) prepared by Atsushi Kajiwarra on identification of different types of radicals via electron paramagnetic resonance spectroscopy.

Future Project Ideas (a long-standing list):

- Critically evaluated termination rate coefficients as a function of conversion
- Critically evaluated chain-transfer rate coefficients
- Critically evaluated depropagation rate coefficients

- Critically evaluated copolymerization reactivity ratios
- Critically evaluated combination/disproportionation ratios
- Critically evaluated rate coefficients for ionic polymerizations
- ATRP: current situation on mechanisms; benchmark rate coefficients

Greg Russell welcomed **Jan Apotheker (CCE)** who acknowledged the fruitful cooperation of the Polymer Division with CCE and he stressed the expertise of the Division looking forward to joint projects (the Wikipedia Project being one candidate). The necessity of impact of IUPAC terminology and nomenclature on textbooks and journals was stressed and the importance of the 'brief guides' acknowledged. Jan Apotheker announced a new definition of the mole in the near future that should also cover gels. It is important to find out which educational activities/deliveries the scientific community expects.

9 Trends in Polymer Science - STP (Yusuf Yagci)

Yusuf Yagci gave a review of the trends in Polymer Science from the 2010 to 23.07.2015, as obtained from ISI-WOS data. He also explained the method of mining those data. The detailed graphics can be found in the **Appendices 3 to 9**. There is still a significant increase of the number of annual publications in Polymer Science. 61,033 original papers were counted up to the deadline. Most of the articles (24 countries) were published by China 13,582 followed by the USA 8,986, Japan 4,811 and Germany 4,482. The ranking of the journal is led by *Applied Polymer Science*, followed by *Polymer Rev.*, *Macromolecules*, *ACS Macro Lett.*, *Biomacromolecules*, *Polymer Chem.*, *J. Membrane Sci.*, and *Polymer*, followed by 77 others. The most popular scientific field was that of Polymer Processing 12,720, Composites 12,674, Polymer Synthesis 12,302, Nanocomposites 9,219, Polymer Characterization 8,096.

11. Report Sub-Committee on Polymer Education – SPED (Werner Mormann)

After Werner Mormann has stepped down from the Chair of SPED, Chris Ober has agreed to help until the new leadership of SPED will be defined. The plan is to appoint two co-chairs, one for the educational symposia and the second co-chair for new projects. Chris Ober plans to step down after the Istanbul Meeting 2016. The thanks of the Division were expressed to Werner Mormann for his exceptional service for so many years, and the help of Chris Ober during the transition state was greatly appreciated.

Project #2013-046-1-400 (Kratochvíl)

19th UNESCO/IUPAC Postgraduate Course in Polymer Science 2014/2015 (Prague)

Task leader: **Pavel Kratochvíl**

Course co-ordinator: **Adriana Štuncová**

Support through IUPAC Project #2013-046-1-400.

Objective: To enable young university graduates and PhDs from countries with limited research facilities to acquire knowledge on recent advances in polymer science and professional skills needed for promotion of polymer science in their home countries.

Details at http://www.imc.cas.cz/en/umch/kursy_unesco_iupac.htm

6 participants from Croatia, Nepal, Ukraine

20th run (October 2015 – July 2016) is in preparation

Cumulative results of the 19 runs:

graduates: 156 from 22 countries; publications in international journals: 360; citations: 7100 (January 2015).

Additional information:

The Institute of Macromolecular Chemistry in Prague also provides assistance to the Nepali polymer colleagues in their most difficult situation after the earthquake:

Mr. Khim Prasad Panthi and Mr. Purushottam Poudel are two Nepali participants of the 19th run of the course. Mr. Panthi has been admitted as a Ph.D. student at the Institute. Mr. Poudel has successfully passed the Ph.D. admission examination at the Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague. Mr. Poudel's home in Nepal has been destroyed by the earthquake. A non-negligible sum of money has been collected to help him.

The admission process for the 20th run of the Course, 2015-2016, ended before the Nepal disaster, but this notwithstanding Mr. Udit Acharya from that country has been selected and has confirmed his attendance. The statute of the Course does not enable us to cover the travel expenses of the participants. Because of the emergency circumstance, the Director of the Institute has found other financial resources to pay for Mr. Acharya's travel to Prague and back home.

Project # 2014-040-1-400 (Hess)

POLYCHAR 23, Lincoln (Nebraska, USA) 11.05.-15.05.2015

In the year 2015 POLYCHAR (Short Course and Conference) was hosted by the University of Nebraska, Lincoln (UNL),

USA, 11.05-15.05.2015, organized by a local committee (Department of Mechanical & Materials Engineering and the College of Engineering) and international committee with members from Belgium, France, South Korea and Nepal, chaired by Prof. Mehrdad Neghaban (UNL). The conference was endorsed by the International Union of Pure and Applied Chemistry (IUPAC), the IUPAC Polymer Division (Samsung Fund), the American National Science Foundation, the University of Lincoln (UNL), the Office for Research and Educational Development (UNL), the College of Engineering (UNL), the Department of Mechanical & Materials Engineering (UNL), the City of Lincoln Convention and Visitors Bureau, and the John A. Woollam Company.

A limited amount of money was granted by IUPAC and the Samsung fund for the support of graduate students and young scientists from underprivileged countries; however, due to too high expectations by the applicants and visa problems it was finally only possible to support one young scientist from disaster-stricken Nepal, namely:

Bishnu Prasad Neupane, School of Health and Allied Sciences, Pokhara University, Nepal: *Conversion of Waste Paper into Bioplastics – Poly(lactic acid)*

Some applicants from Africa (Nigeria and Cameroon) turned the offer down because they needed stronger support and could not raise additional money (although all fees were cancelled). There was one applicant from Malaysia who did not obtain a US visa (for unknown reasons).

There were six Plenary Lectures (**two Young Scientists Plenaries**), the Flory Medal Talk and 13 individual Sessions in two parallel events, namely:

- Characterization Methods and Structure-Properties Relations (15 contributions); Predictive Methods, Modelling and Simulation (11)
- Biomaterials, Drug Delivery and Tissue Engineering Materials – Green Polymers, Green Engineering and Recycling (11); Fibers, Interfaces and Composite (6)
- Nanomaterials and Smart Materials (10)
- Dielectric-, Electrical-, Magnetic-, Optical- and Optoelectronic Properties (8)
- Polymers in Electronics and Optoelectronic Devices (5)
- Progress in Polymer Synthesis (5)
- Characterization with Scanning Probe Microscopy (4)
- Rheology, Solutions and Processing – Mechanical Properties and Performance (5)
- Processing and Properties of Semicrystalline Polymers (6)

These Sessions included 87 oral contributions (10 keynote speakers, 14 invited speakers), 45 Posters (one Session) with 103 registered participants (42 students) from 21 countries and 5 continents. Apart from the USA there were participants from France, Belgium, Nepal, Singapore, Poland, South Korea, Germany, Japan, China, Malaysia, Austria, Portugal, Canada, India, Georgia, Colombia, China (Taiwan), Mexico and Ireland.

The six Plenary Speakers were two (female) '**Young Scientist's Plenaries**':

Gila Stein (Young Scientists' Plenary), University of Houston, USA: *Grazing Incidence Small-Angle X-Ray Scattering: Principles, Models, and Application for Nanostructured Thin Films*

Abby Whittington (Young Scientists' Plenary), Virginia Tech: *Polymer Characterization of Medical Devices for Use in Cancer Patients*

There was an extra talk on Recent Developments in the IUPAC Polymer Division by Michael Hess, informing about the general work of the Polymer Division and educational aspects of the work of the Division.

The full program can be found at: http://polychar23.unl.edu/downloads/Sessions_Program.pdf

The **Short Course** (tutorial) consisted of 9 contributions (50 min + discussion), namely:

- DYNAMIC-MECHANICAL ANALYSIS (Michael Hess, University of North Texas, USA)
- RHEOLOGY & PROCESSING (Dirk Schubert, University Nuernberg-Erlangen, Germany)
- CHARACTERIZATION OF POLYMERIC NANOSTRUCTURES WITH COMBINED SCANNING PROBE AND FLUORESCENT MICROSCOPY (Holger Schoenherr, University Siegen, Germany)
- GLASSTRANSITION AND GLASSTRANSITION TEMPERATURE (Jean-Marc Saiter, Universite de Rouen, France)
- MICROMECHANICS OF POLYMERS: MICRO-AND NANOSCOPIC PROCESSES OF DEFORMATION AND FRACTURE (Sven Henning, Fraunhofer Institute for Mechanics of Materials, Halle, Germany)
- SOLID STATE NMR (Bernhard Bluemich, University Aachen RWTH, Germany)
- BASICS OF SCATTERING TECHNIQUES: X-RAY, NEUTRON, LIGHT (Jean-Michel Guenet, Institute Charles Sadron and Universite Strasbourg, France)
- PHOTOCHEMISTRY IN POLYMER SCIENCE (Brett Fors, Cornell University, USA)
- FRICTION, WEAR AND SCRATCH RESISTANCE OF POLYMERS (Natalie Hnatchuk, University of North Texas, USA)

The Short Course lecturers were available for all participants for further discussions throughout the Conference. There were about 47 participants, mostly but not exclusively students.

The **IUPAC Poster Prizes** (students) were given to:

Evan Schwahn, UNL Mechanical and Materials Engineering Department, USA

Controlled Curing of Acrylate: System Modelling and Application in Stereolithography

Franz Lanyi, University Erlangen-Nuremberg Institute of Polymer Materials, Germany

Novel Chart For Representation of Material Performance and Reliability

Taylor Stockdale, UNL, Mechanical and Materials Engineering Department, USA

Manufacturing of Polyimide Fibre-Reinforced Nanocomposites

The **Bruce Hartmann Price for Young Scientists** went to:

Brett Fors, Department of Chemistry and Chemical Biology, Cornell University, Ithaca, USA

Deterministic Control of Polymer Molecular Weight Distribution

The **Jürgen Springer Price for Young Scientists** went to:

Carolina Gonçalves, Faculty of Engineering, University of Porto, Portugal

Xanthan Gum and Chitosan as Natural Adhesives for Cork

Three **Carl Klason Student Awards** went to:

Yoga Salim, Department of Chemistry, Faculty of Applied Sciences, University Malaya, Kuala Lumpur, Malaysia

Thermal Degradation in the Melt Reaction between Poly(3-hydroxybutyrate-co-3-hydroxyhexanoate) and Epoxidized Natural Rubber

Kaspars Maleckis, UNL Mechanical and Materials Engineering Department, USA

Ultrahigh-Performance Nanofibres from DNA and Proteins

Hao Liu, Department of Polymer Science, University of Akron, USA

Two-Dimensional Nano-Crystals of Molecular Janus Particles

Diplomas of Distinction went to:

Taria Jamil, Polymer Engineering Department, University of Akron, USA

Mechanism of Molecular Interaction of Superplasticizer Oligomers with Hydrated Cement Phases

Xue Li, Chemistry University of Alberta, Canada

Polymer-Based Materials for Building Artificial Muscles and Three Dimensional Structures by Self-Rolling

Yaping Ding, University Erlangen-Nuremberg Institute of Polymer Materials, Germany

Electrospun PHB/PCL/Fumed Silica Fibrous Structure for Bone Tissue Engineering

Wenglong Li, UNL Mechanical and Materials Engineering Department, USA

Characterization of the influence of depth in photo curing of acrylate: a method based on rapid-scan FTIR during laser curing on an ATR

Simon Schönherr, Graphene-Based Nanotechnology, University Siegen, Germany

Investigation of Electronic Properties of a Graphene Field Effect Transistor

Polymer Education Symposium MACRO 2014

Project #2013-053-1-400 (Mormann, Ober)

Polymer education symposium MACRO 2014 Chiang Mai, Thailand

1.5 days of sessions with 14 oral contributions and a round-table session

Division IV – Polymer Education Website (Ober)

Project #2012-027-3-400

<http://www.iupac.org/polymedu/index.html>

Goal: Enhancing Educational Website for Polymer Chemistry

Task group:

C. Ober (Chair)

R.G. Jones (in absentia)

C. dos Santos (in absentia)

L. Corley (young observer)

Choon Do (in absentia)

Chris Fellows (new member from Australia)

11. Conferences (Greg Russell by on behalf of Igor Lacík)

In December 2013 Prof. P. Kubisa completed his term as reviewer of “Applications for IUPAC Sponsorships” (AIS) for the Polymer Division. Since January 2014, the AIS of Division IV have been reviewed (initially in communication with

P. LeClair², who contacted the organizers and asked for amendments in case they are needed) by Igor Lacik. Instead of IUPAC-*Sponsored* conferences, the new term IUPAC-*Endorsed* conferences has started to be used, the reason being that the former was confused with financial Conference support by IUPAC, which is not the custom. Basically conferences now apply for permission to be associated with the IUPAC brand.

The following guidelines should be followed for application of IUPAC Endorsement of a Conference:

- Organizers of a conference, who wish to apply to IUPAC for sponsorship, should supply the information requested in this questionnaire, preferably one year in advance
- The conference must be located in a country represented in IUPAC by a National Adhering Organization
- In general, IUPAC sponsored conferences should be international in the sense that they are intended to attract participants from anywhere in the world
- significance of conference
- suitability of conference
- evidence of sufficient planning
- suitable time spacing of conferences of a similar type
- rotation of leadership for conferences in a series or of a similar type
- International Advisory Board that is geographically diverse
- participation of industrial chemists and women as speakers and as members of the International Advisory Board

Conferences that are routinely endorsed by the Polymer Division:

- International Symposium on Ionic Polymerization
- International Symposium on Macromolecular-Metal Complexes (MMC)
- International Conference on Polymer Characterization (POLYCHAR), World Forum for Advanced Materials
- International Conference on Polymers and Organic Chemistry
- UNESCO School & IUPAC Conference on Macromolecules (routinely in South Africa)
- Novel Materials and Their Synthesis (NMS) (routinely in China)
- IUPAC World Polymer Congress (International Symposium on Macromolecules-MACRO)

In 2015, the Polymer Division endorsed the following Conferences:

1. 23rd World Forum on Advanced Materials (POLYCHAR 23) 2015
May 12 – 15, Lincoln, Nebraska, USA (Chairman: Prof. Mehrdad Negahban)
2. 22nd International Symposium on Ionic Polymerization (IP-2015)
July 5 – 10, Bordeaux University, Talence, France (Chairman: Prof. Stéphane Carlotti)
3. European Polymer Congress 2015
June 21 – 26, Dresden, Germany (Chairman: Prof. Brigitte Voit)
4. 35th Australasian Polymer Symposium (35APS)
July 12 – 15, Gold Coast, Queensland, Australia (Chairman: Prof. Amanda Ellis)
5. 4th Federation of Asian Polymer Societies – International Polymer Congress (4th FAPS-IPC 2105)
October 5 – 8, Kuala Lumpur, Malaysia (Chairman: Professor Dr. Rusli Daik)
6. 11th International Conference on Novel Materials and their Synthesis (NMS-XI)
October 11 – 16, Qinhuangdao, China (Chairman: Prof. Yuping Wu)
7. 11th International Conference on Advanced Polymers via Macromolecular Engineering (APME 2015)
October 18 – 22, Yokohama, Japan (Chairman: Prof. Takeshi Endo)
8. 79th Prague Meeting on Macromolecules: Functional Polymers at Bio-Material Interfaces
June 28 – July 2, 2015, Prague, Czech Republic (Chairman: Dr. František Rypáček, PhD)
9. 16th International Symposium on Macromolecular Complexes (MMC-16)
Aug 10 – 14 2015, Wrocław, Poland (Chairman: Prof. Andrzej W. Trochimczuk)
12. 45th IUPAC World Chemistry Congress
August 9–14 2015, Busan, Republic Of Korea (Chairman: Prof. Andrzej W. Trochimczuk)

Conferences approved (already at the IUPAC webpage) or pending endorsement by Division IV for 2016:

1. Polymer-solvent Complexes and Intercalates (POLYSOLVAT-11), approved
January 27 – 30, Kolkata, India (Chairman: Prof. Arun Kumar Nandi)
2. Polymers and Organic Chemistry 2016 (POC 2016), pending
First half of June 2016, Heraklion, Crete, Greece (Chairman: Prof. Kostas Demadis)
3. The 15th International Conference on Molecule-Based Magnets (ICMM2016), pending
September 4-8, 2016, Sendai, Japan (Chairman: Prof. Masahiro Yamashita)

² Paul LeClair is now no longer with IUPAC

4. MACRO 2016 – 46th IUPAC World Polymer Congress, approved
July 17-21 2016, Istanbul, Turkey (Chairman: Prof. Yusuf Yagci)

Special Macromol. Symp. Issues:

2014/2015

- Macromolecules and Materials, March **2014**, Volume 337, Issue 1, pp. 8–133
- Polymer Spectroscopy, May **2014**, Volume 339, Issue 1, pp. 1–146
- Molecular Order and Mobility in Polymer Systems, February **2015**, Volume 348, Issue 1, p. 1-67
- Ionic Polymerization Part I, March **2015**, Volume 349, Issue 1, p. 1-114
- Ionic Polymerization Part II, April **2015**, Volume 350, Issue 1, p. 1-116

Sunday, 09.08.2015

12. Report on Division Web Page and Electronic Publications (dos Santos, submitted in absentia)

Claudio dos Santos reported that the Division website has been updated and many changes occurred. The new website should be more user-friendly. The old IUPAC website, however, is still accessible – www.old.iupac.org. He asked the Division to check the entries. There is another communicative website for members of the SPT only, called REDMINE and organized by Roger Hiorns. Any input to extend or improve the website is welcome.

13. Strategy (Sawamoto)

There are different aspects of strategy to be considered:

Strategy in Polymer Science: deals with the question: what are polymers, and how to fuse them into biology, medicine, electronics, etc.?

Strategy in IUPAC / Polymer Community: intra-divisional and inter-divisional activities and the relation of chemistry / physics with materials / functions.

Strategy in World Society: identify ways to contribute to the environment, sustainability, the world's and societies' needs, technical and industrial progress, and education, including launching a campaign for better recognition of IUPAC within this framework

Strategy for Younger Generations

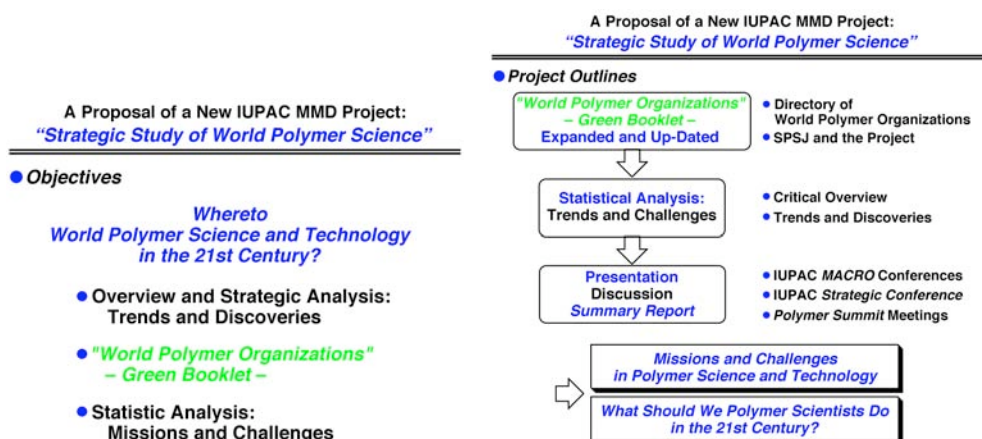
Corresponding activities in the past have been:

1. Strategic Polymer Conferences

- 1st in Kyoto 2002 (Takeo Saegusa and Akihiro Abe) Mission and Challenges of Polymer Science and Technology - Polymer Science and Technology is central to modern functional and structural materials
Pure Appl. Chem. 75,1359–1369 (2003)
- 2nd in New York in 2007 (Kalle Levon and Chris Ober) -- Macromolecules for Sustainable, Safe and Healthy World

2. Polymer Summit Meeting and a Symposium on International Collaboration in Polymer Science and Technology (2004 World Polymer Congress; Paris) A Strategic Project on Future Development in Polymer Science (Project #2002-057-1-400; M. Sawamoto)

“World Polymer Organization” and trends in world polymer science, the annual report of the analysis of polymer relevant journals (see topic 9 and appendix 5, 6)



International cooperation in relation to Division IV strategy:

- In the Pacific area: Pacific Polymer Federation (PPF)
- In the European area: European Polymer Federation (EPF)
- In the Asian area: Federation of Asian Polymer Societies (FAPS), South/East Polymer Scientists Meeting (SEPSM)
- In particular in Japan: The Research Council of Japan, The Japan Society for Promotion of Science (JSPS; Committee of International Projects), The Japan Union of Chemical Sci. and Tech., The Chemical Society of Japan.

Meetings in the past during the *European Polymer Conference* (EPF; since 2007) and the *Pacific Polymer Conference* (PPC; since 2007).

A list of the World Polymer Organizations (a directory of 50 societies in polymer science worldwide) is prepared by the Society of Polymer Science Japan (SPJS; <http://www.spsj.or.jp>), once sponsored by Division IV Project #2002-057-1-400. An up-dated version will be available on the occasion of MACRO 2016 in Istanbul.

The strategy of Division IV to reinforce its position within IUPAC and the scientific community should focus on the relations of polymer science and the polymer community, polymer science and society, polymer science in the environment, especially areas such as sustainability, energy conversion and storage, the problems of global warming, etc.

Concerning the **Younger Generations**, *International Relations* should be supported and reinforced. Human exchange is an important issue in this context, see for example the educational project of Pavel Kratochvil **Project #2013-046-1-400** or a platform for post-doctoral positions/applicants. Inter-society exchange has to be intensified (within polymer chemistry, chemistry and related fields, and on/through international conferences and workshops).

The visibility of IUPAC has to be developed and improved, for example its presence on conferences such as PACIFICHEM 2015 in Hawaii. The retired Division Presidents are asked to develop ideas and to personally address people. The Wikipedia Project is also well suited to improve the visibility of IUPAC in the scientific community. For the 2019 Centennial in Paris, a task force has been formed to evaluate performance and to check by-laws and everything related to optimization of performance. The same is expected from the individual Divisions. The Division President, Vice President and Mitsuo Sawamoto should complement from the side of the Division the efforts of IUPAC headquarters in terms of activities and revising the mission statement – these are all of importance for the year 2019. The Division President will be part of the organizing committee, hence directly participating in the discussion of preparations. Early preparation is vital for a high-impact presentation at the World Chemistry Congress 2019 in order to visualize education, mechanisms and general aspects of polymer science during this important event. The Division's projects should be visible.

Mitsuo Sawamoto asks for opinions – what is the position of the Polymer Division and which actions should be taken? The Polymer Division represents a group of experts ready for consulting (industry, governments, etc.), it can offer advisory functions for the polymer community. The activities of IUPAC have to be made public. It was suggested to present the Division's activities at MACRO 2016 in Istanbul. A Strategic Review by Mark Cesa is available through Greg Russell.

14. The Acting President's Statement (Greg Russell)

Samsung Total Petrochemicals has changed its name to Hanwha Total Petrochemicals, therefore the name of the biennial **Samsung Young Polymer Scientist Award** granted at MACRO – IUPAC World Polymer Congress is changed to **Hanwha Total-IUPAC Young Polymer Scientist Award**.

The VP's topics were somehow distributed over the meeting and are summarized in the following.

Election Report

The Nominating Committee 2014-2015 Nominating Committee 2016-2017

Greg Russell (chair ex officio)

Kris Matyjaszewski (USA)
Ezio Rizzardo (Australia)
Pavel Kratochvil (Czech Rep.)
Michael Dröscher (Germany)

Kris Matyjaszewski (USA)
Jung-Il Jin (South Korea)
Chris Ober (USA)

Division Officers 2012-2015

Michael Buback (DV)
Greg Russell (DVP)
Michael Hess (Secretary)

2016-2019

Greg Russell
Christine Luscombe
Michael Walter

Polymer Division Members (TMs, AMs, NRs) for the 2016-7 Biennium:

2014-2015

2016-2017 (indicating *new personnel*)

7 TMs (reaffirmed or *elected*)

Jiasong He (SPCT)
Sabine Beuermann (SKM)
Mitsuo Sawamoto (strategy)
Bernadette Charleux (educ)
Roger Hiorns (SPT)
Graeme Moad (SPT)
Werner Mormann (educ)

Jiasong He (SPCT)
Sabine Beuermann (SKM)
Mitsuo Sawamoto (strategy)
Natalie Stingelin (SPT, SPED)
Igor Lacík (conferences)
Yusuf Yagci (trends, MACRO 2016)
Michael Buback (DPP)

6 AMs (appointed)

Dick Dijkstra (SPCT)
Robin Hutchinson (SKM)
Tim Long (education)
Igor Lacík (conferences)
Yusuf Yagci (trends)
Dennis Smith (relations)

Dietmar Auhl (SPCT)
Robin Hutchinson (SKM)
Rigoberta Advincula (SPED)
Roger Hiorns (SPT)
Graeme Moad (SPT, kinetics)
Michael Hess (SPT, SPED, assistant secretary)

NRs (10 appointed)

Voravee Hoven (Thailand)
Chin-Han "Melissa" Chan (Malaysia)
Theo Dingemans (Holland)
Cláudio dos Santos (Brazil)
Chain-Shu Hsu (China/Taipei)
Richard Jones (UK)
Doo Sung Lee (South Korea)
Aziz Muzafarov (Russia)
Mohammad Siddiq (Pakistan)
Jiri Vohlídal (Czech Republic)

Voravee Hoven (Thailand)
Chin-Han Chan (Malaysia)
Mario Malinconico (Italy)
Cláudio dos Santos (Brazil)
Chain-Shu Hsu (China/Taipei)
Richard Jones (UK)
Doo Sung Lee (South Korea)
Olga Philippova (Russia)
Rameshwar Adhikari (Nepal)
Jiri Vohlídal (Czech Republic)

Considerations for NR appointments: *should* only come from countries not already represented; *should* be two terms maximum; preference to NAO nominations; previous work and visibility; eligibility for other positions.

Roger Hiorns observed that NRs frequently do not know what the Division expects from them. **Chris Ober** proposed to write a welcome letter with the corresponding information and suggested a template for such letter. **Greg Russell** stated

that he has already done this but the response was frustrating. **Dannibelle Haase** suggested a mid-term check of the performance. It is, however, not clear what the consequences could be in case of no response, Fabienne Meyers might be able to give an answer.

Interdivisional Activities:

- Who are they all and what are the positions?
- Often all one sees is bewildering acronyms!
- An authoritative list needs to be started!³
 - Committee on Chemical Education (CCE): **Chris FELLOWS**
 - Interdivisional Subcommittee on Materials Chemistry (ISMC): **Chris Ober** Other(s)?
 - Interdivisional Committee on Terminology, Nomenclature and Symbols (ICTNS): **Graeme Moad**
 - Pure and Applied Chemistry Editorial Advisory Board (PAC-EAB): **Mitsuo Sawamoto, Jung-Il Jin**
 - CHEMRAWN: **Chris Ober**? Replace by Rameshwar Adhikari (Mario Malinconico in another capacity)?
 - Subcommittee on Green Chemistry: **Christine Luscombe, Supawan Tantayanon** suggested to join
 - International Scientific Committee for the UNESCO-PhosAgro-IUPAC Programme: **Sabine Beuermann** relation with Green Chemistry
 - Committee on Chemical Industry (COCI) to be investigated by **Mitsuo Sawamoto**
 - More? CCRF (**Chris Ober** Comm on Chem Res Funding)

IUPAC help for Nepal (VP, continued)

The suggestion was raised by Michael Hess with his e-mail (09.06.2015) to the Division President. Answers from IUPAC are:

Michael Buback: "it seems possible to use some of the Division budget to help Nepal."

Pavel Kratochvil "has two Nepali students in his 19th UNESCO-IUPAC course (see top 10, 18) and some money has been collected. For the 20th course another student was accepted and the host institute in Praha could find extraordinary financial travel support. IUPAC has provided travel expenses for one Nepali student to attend POLYHAR 23 (Lincoln, Nebraska) through the budget for students from underprivileged countries. The POLYCHAR community has provided further financial support for conference attendees from Nepal and they are working on a program for postdoctoral students."

Other matters (VP, continued)

Greg Russell reports on complaints from Dick Jones on problems submitting and handling manuscripts to be published in P&AC. Dick demands that the P&AC manuscript central pages should be regularized as soon as possible. Apparently these problems are meanwhile being addressed with the assistance of Fabienne Meyers and Joshua Gannon (of Gruyters).

A Review on Strategy will be presented to IUPAC Council at this meeting by Mark Cesa, the President of IUPAC until the end of 2015. It is in a separate document, available upon request. Mark Cesa requests of Division Presidents, Standing Committee Chairs and committee members to begin to work within your Division and Standing Committees to encourage your volunteers to align IUPAC work with the new strategy.

There is an Indian Conference also named MACRO, a "biannual" (so they say, but they probably mean *biennial*) conference on Polymer Science and Technology organized by the Society of Polymer Science, India. The VP asks if there is concern about the similarity of the name with the IUPAC MACRO Conferences.

Upcoming MACRO and GA/World Chemistry Congresses

Upcoming Conferences are:

- Macro2016: Istanbul, Turkey (17-21 July)
- IUPAC WCC & GA 2017: Sao Paolo, Brazil
- Macro2018: Cairns, Australia (see separate report 15.2)
- IUPAC WCC & GA 2019: Paris, France. To be held in Paris, France to celebrate the centenary of the founding there of IUPAC. In recognition of this centenary, there should be special IUPAC activities both at the conference and throughout the year, including in the Polymer Division.
- Macro 2020: Mexico or South Korea (Jeju Island): the problem of the (absence of IUPAC) membership of Mexico is not yet settled. Mexico is still interested but there is no sign of progress. However, a decision is required because the preparations have to start soon, so a non-binding referendum was held. The result was in

³ This list has progressively been expanded and corrected, and will be presented in this more accurate form at Macro2016, where all the people concerned will be expected to report on activities.

favor South Korea's application for 2020 by **16** votes to **3**, with **3** abstaining from voting.⁴ Korea has already organized the IUPAC World Polymer Congress in Seoul in 1996. The Korean Polymer Society should be informed about further procedures by November 2015. The tentative program (Sessions) for **2020** could read:

- Advances in polymer synthesis and characterization
- Advances in polymer structure, property and processing
- Advances in functional polymers
- Nanostructured polymeric materials
- Polymers for information technology
- Polymers for biomedical application
- Polymers for clean energy
- Eco-friendly polymers
- IUPAC WCC & GA 2021: likely to be awarded to Beijing, China (will be decided at the 2017 GA)
- Macro2022: South Korea or Mexico.⁴

Further future Conferences besides MACRO and GA/World Chemical Congress are:

- International Polymer Conference, Kuala Lumpur (Malaysia), October 6-8, 2015
- PACCON – Pure and Applied Chemistry Conference on the occasion of 100 years of advanced chemistry in Thailand, Bangkok, February 9-11, 2016
- XXI IUPAC CHEMRAWN Conference on Solid Urban Waste Management, Naples (Italy), April 6-8, 2016
- POLYCHAR 24, Poznan (Poland), 09.-14. May, 2016
- IMTCE – 10th International Materials Technology Conference, Kuala Lumpur (Malaysia) 16.-19-05., 2016

Awards Coordinator

- There are three awards/prizes in the PD:
 - **Samsung Award**, now named **Hanwha Total-IUPAC Young Polymer Scientist Award** (see above)
 - **DSM Award**
 - **Polymer International Prize**
- It would make sense for the one person to manage/oversee all these: timing, criteria, selection committees, liaison, etc. **Michael Hess** has generously volunteered for this task and is duly appointed.

Structure of the next Division/SPT-Meeting (MACRO 2016, Istanbul, as proposed by Roger Hiorns and Greg Russell):

- Tuesday (12 July): SPT
- Wednesday: SPT
- Thursday: SPT
- Friday: SPT
- Saturday: Polymer Division
- Sunday (17 July): AM – Polymer Division; PM – other SCs (e.g. SPED); evening – conference opens
- Monday: conference
- Tuesday: conference
- Wednesday: conference
- Thursday (21 July): conference (last day)

Timetable of all PD Meetings

This can be intricate: PD, SPT, SPED, other PD groups, inter-division groups. It requires the left hand to know what the right hand is doing, so there should be a “central authority”. The SPT Chair appears to be the person best suited for that purpose. Therefore in future all GA meetings involving PD personnel will be coordinated through Roger Hiorns.

15. Accelerating Participation and Leadership of Women in Chemistry (Stingelin on behalf of Angela Wilson and Carolyn Ribes)

There is a new IUPAC project with ICSU support:

www.iupac.org/project/2015-007-1-020

The mission:

⁴ Michael Buback has subsequently written to Doo Sung Lee confirming that he will chair Macro 2020 on Jeju Island. This means that Mexico slides to 2022, still contingent on it becoming a member of IUPAC again.

Accelerate Participation and Leadership of Women in Chemistry World-wide

Objectives:

Investigate gender disparity in chemistry
Assess the situation globally through the review of existing data and surveys
Develop and disseminate best practise and recommendations

Framework and deliverables:

Define a vision for IUPAC for Women in Chemistry
Develop a strategy for driving to the vision
Develop the critical assessment of existing information
Gain support within IUPAC and from IUPAC leadership
Develop implementation plan of this strategy

Activities in Busan

2015 Distinguished Women in Chemistry/Chemical Engineering Award
Presentation of the Awards recipients at the Congress Tuesday at 1:00 – 2:00 ... directly preceding
Symposium: *Women in Chemistry: Gaining Momentum*, Tuesday at 2:15 – 6:30
Reception at 6:30 – 7:30
Project Team Meeting:
Wed morning 9:00 – 12:30 -- walk-in welcome!

Distinguished women in chemistry:

Professor Lucia Banci, University of Florence, Florence, Italy
Professor Margret Brimble, The University of Auckland, Auckland, New Zealand
Professor Ewa Bulska, Uniwersytet Warszawski, Warsaw, Poland
Professor Karen Gleason, Massachusetts Institute of Technology, Cambridge, MA, USA

Professor Janet Hering, Swiss Federal Institute of Aquatic Science & Technology, Dübendorf, Switzerland
Professor Nadia G. Kandile, Ain Shams University, Heliopolis, Cairo, Egypt
Professor Maki Kawai, RIKEN & The University of Tokyo, Tokyo, Japan
Professor Hyunjoo Lee, Korea Advanced Institute of Science and Technology, Daejeon, South Korea
Professor Carmen Najera, University of Alicante, Alicante, Spain
Professor Helga Rübsamen-Schaeff, AiCuris GmbH & Co. KG, Wuppertal, Germany
Professor Roberta Sessoli, Università degli Studi di Firenze, Florence, Italy
Professor Livia Simon Sarkadi, Corvinus University of Budapest, Budapest, Hungary

The IUPAC TEAM

Prof. Angela Wilson (co-chair) (Angela.Wilson@unt.edu), Department of Chemistry University of North Texas Denton, Texas, USA
Dr. Carolyn Ribes (co-chair) (cribes@dow.com), The Dow Chemical Company, Terneuzen, Netherlands
Prof. Eunji Sim (esim@yonsei.ac.kr), Department of Chemistry, Yonsei University South Korea
Prof. Mary Garson (m.garson@uq.edu.au), School of Chemistry and Molecular Biosciences, University of Queensland, Australia
Prof. Ingrid Montes (ingrid.montes58@gmail.com), Department of Chemistry, University of Puerto Rico at Rio Piedras, Puerto Rico
Prof. Vania Zuin (vaniaz@ufscar.br), Federal University of São Carlos, São Carlos, Brazil
Prof. Jane Bochari Nyakang'o, Kenya Cleaner Production Center, Nairobi, Kenya
Prof. Natalia Tarasova (tarasnp@muctr.ru) IUPAC Vice President
Mendeleyev University of Chemical Technology
Moscow, Russia Dr. Tatiana Semenova (statiana1326@gmail.com)
D. Mendeleev University of Chemical Technology of Russia, Institute of Chemistry and Problems of Sustainable Development, Department of Sociology
Dr. Fabienne Meyers (fabienne@iupac.org), Associate Director, IUPAC, Boston, MA, USA

16. Future World Polymer Congresses

16.1 MACRO 2016 Istanbul (Yagci)

This Conference is planned for **Sunday 17 – Thursday 21 July 2016 in the Halic Congress Centre** on the Golden Horn in Istanbul. The general scope will be ‘Advancing Polymer Science and Technology’. The composition of the international advisory board and the names of the invited speakers is presently still under discussion. The scientific program is planned to comprise 14 sessions, namely:

1. Recent Developments in Polymer Synthesis

- a) Controlled/Living Polymerization
Co-organizer: Prof. Masami Kamigaito
Coordinator: Assoc. Prof. Remzi Becer
- b) Complex Macromolecular Structures
Co-organizer: Prof. Filip Du Prez
Coordinator: Assoc. Prof. Amitav Sanyal
- c) Light-induced Reactions
- d) Co-organizer: Prof. Xavier Allonas
Coordinator: Assoc. Prof. Binnur Aydoğan Temel
- d) Condensation Polymerization and Thermosets
Co-organizer: Prof. K. Yonezawa
Coordinator: Assoc. Prof. Baris Kiskan

2. Polymer Characterization by New and Combined Techniques

Co-organizer: Prof. Michael Hess
Coordinator: Prof. Levent Demirel

3. Macromolecules & Nanotechnology

Co-organizer: Prof. Gyula Julius Vancso
Coordinator: Assoc. Prof. Tamer Uyar

4. Macromolecules in Biotechnology & Medicine

Co-organizer: Prof. Martina Stenzel
Coordinator: Asst. Prof. Muhammet Kahveci

5. Energy, Optics, & Optoelectronics

Co-organizer: Prof. John R. Reynolds
Coordinator: Assoc. Prof. Ali Cirpan

6. Polymer and Polymer-Based Membranes

Co-organizer: Prof. Benny D. Freeman
Coordinator: Assoc. Prof. Tuba Erdogan Bedri

7. Smart and Functional Polymers

Co-organizer: Prof. Richard Hoogenboom
Coordinator: Prof. Faruk Yilmaz

8. Renewable Resources and Biopolymers

Co-organizer: Prof. Henri Cramail
Coordinator: Asst. Prof. Sinan Sen

9. Polymer Engineering, Processing, and Characterization

Co-organizer: Prof. Mukerrem Cakmak
Coordinator: Assoc. Prof. Ali Durmus

10. Polymer Physics

Co-organizer: Prof. K. Tanaka
Coordinator: Asst. Prof. Deniz Ceylan Tuncaboylu

11. Polymer Education

Co-organizer: Prof. Christopher Ober and Prof. W. Morman
Coordinator: Assoc. Prof. Mustafa Sözbilir

12. Industrial Polymers

Co-organizer: Dr. Y. Kwon (Korea), Dr. A. Taden (DE)
Coordinator: Asst. Prof. Huseyin Esen

13. Porous Polymer, Gels

Co-organizer: Prof. M. Silverstein
Coordinator: Asst. Prof. Deniz Ceylan Tuncaboylu

14. Modeling and Simulation of Polymers

Co-organizer: Prof. Stefano Valdo Meille
Coordinator: Assoc. Prof. Nurcan Tuzun

Planned Plenary Speakers are: **Robert H. Grubbs** (has not yet accepted) California Institute of Technology, USA; **Krzysztof Matyjaszewski**, Carnegie Mellon University, USA (confirmed); **Niyazi Serdar Sarıçiftci**, Johannes Kepler University, Austria; **Kristi S. Anseth**, University of Colorado Boulder, USA, (confirmed); **Nikos Hadjichristidis**,

KAUST, Saudi Arabia (confirmed); **Markus Antonietti**, Max Planck Institute, Germany, (confirmed); **Takuzo Aida**, University of Tokyo, Japan (confirmed).

The social program was outlined in detail and promises to be mouthwatering.

16.2 MACRO 2018 Cairns

Martina Stenzel and Sebastien Perrier were unable to join the Busan Meeting; the [following update arrived only after the meeting was closed](#).

Preliminary Program:

1. Recent Developments in Polymer Design
2. Polymers & Nanotechnology
3. Polymers in Biotechnology, Medicine & Health
4. Energy, Optics, & Optoelectronics
5. Smart and Functional Polymers
6. Renewable Resources and Biopolymers
7. Polymer Engineering and Modelling
8. Polymer Characterization
9. Polymer Education
10. Innovation and industry

A logo has been decided on and currently a flyer is being designed. Promotion will be started at Pacificchem 2015 in December in Honolulu. Plenary lectures are presently under discussion. One of the reasons is that we don't know yet with certainty who will be speaking at Istanbul. This will be decided after the Plenary Speakers of MACRO 2016 have been identified because an overlap should be avoided and it might be too early for invitations 3 years in advance. Before the end of 2015 the complete local Scientific Committee will be in place and will decide upon the leadership of the ten Sessions above. An International Advisory Committee will then be constituted to help in identifying candidates for plenary and keynote speakers. The creation of the website is in progress, with preparation being supervised by **Martina Stenzel**.

17. Reports from NR's

MACRO 2014, Chiang Mai (Hoven)

There were 5 invited speakers, 6 keynote/awardee speakers, 200 invited talks and 776 contributed papers in 17 parallel oral sessions and 2 poster sessions. Two pre-conference workshops were offered by COAX (Surface Analysis by SEM/EDX and AFM) and Bruker (Chemical Structural Analysis by NMR). Student scholarships (travel and accommodation) were granted from IUPAC for students from Brazil (1), India (2), China (3), Chile (1), Japan (3) and Saudi Arabia (1). The PTT-Group covered the conference fee for 50 students, these being from Nepal (1), Malaysia (3), China –Taipei (3), South Korea (6), Hong Kong (1), Thailand (22), Turkey (1), India (2), China (3), Chile (1), Japan (3) and Brazil (1). Dow covered the conference fee for an additional 20 Thai students.

The total registration amounted to 1118 participants with 677 international (from 50 countries) and 441 local, including 175 international committee speakers and 98 locals. IUPAC and the Bangkok Bank provided grants for students' support. Poster awards were also be provided with some money. The USD 10,000 donated from Blacksburg were not used and can be forwarded to MACRO 2016 Istanbul, it can help to support students.

Report from Malaysia (Chan)

Chin Han "Melissa" Chan reported from the Institute Kimia Malaysia (IKM), the Malaysian Polymer & Materials Chemistry Section, Kuala Lumpur, Malaysia, <http://www.ikm.org.my> email: ikmmy@pc.jaring.my. The main activities of IKM are organizing conferences and workshops, interacting with industry to exchange ideas and opinions, fostering and maintaining strong international links in the polymer and materials science community, fostering and maintaining good relationships with other professional bodies and governmental and other national agencies. IKM is a member of the Federation of Asian Polymer Societies (FAPS) and the Pacific Polymer Federation (PPF), the Malaysian Plastic-Manufacturers Association (MPMA) and the Plastic and Rubber Institute of Malaysia (PRIM). Regional and international conferences are organized, the latter usually in Kuala Lumpur. An upcoming event is the 4FAPS PC 2015 – Functional Polymers and Advanced Materials for the Future, October 5 – 8 2015, Kuala Lumpur.

Report from Italy (Malinconico)

The reduction of the Italian budget has resulted in a concentration on the support of young scientists in Italy. There is an Italian National Committee for the cooperation with IUPAC. In 2016 they will organize CHEMRAWN (on urban solid waste management) in Rome (April 6-8, 2016) http://www.iupac.org/home/about/members-and-committees/db/division-committee.html?tx_wfqbe_pi1%5bpublicid%5d=021.

18. Report on Nepal (Adhikari)

Rameshwar Adhikari reported about the present situation in Nepal and in particular about the situation of Polymer Science at the Tribhuvan University, Kathmandu, after the disastrous earthquake earlier this year. While reorganization makes progress it will still take years to recover from the damages. There was a lot of help for the group for example from a group at the University Halle/Wittenberg (Germany), from the UNESCO/IUPAC Postgraduate Course in Polymer Science 2014/2015 (Prague) and the Institute of Macromolecular Chemistry in Prague, from POLYCHAR Conference organization (see 10 and 14 above). It would be of great help for the Nepali scientists and students if the scientific community could provide temporary laboratory places and postdoctoral positions as well as reduction of conference fees and travel assistance.

19. Other Businesses (Russell & participants)

The former Division member Prof. Koichi Hatada celebrated his 80th birthday in December 2014 and a laudation was published in *Chem. Int.* (July/August 2015).

During the meeting the sad news arrived that Prof. Ron Sanderson, former Division member from South Africa, passed away a week previously. Expressions of condolence were submitted to South Africa.

20. Date of Next Meeting (Hess)

SPT and Division will meet on the occasion of MACRO 2016, Istanbul, Turkey, July 17-21, 2016, **but before the conference**, namely:

SPT Meeting: Tue 12.07. – Fri 15.07.2016

Division Meeting: Sat 16.07. & Sun 17.07.2016

21. Closing remarks

Greg Russell, the acting Division President, closed the 2015 meeting of the Polymer Division and thanked all participants for their fruitful cooperation since the Istanbul meeting, wished everyone safe travel back home, and looked forward to seeing all again at MACRO 2016 in Istanbul, hosted by **Yusuf Yagci**.

Michael Hess (Secretary), December 2015

Revised May 2016



One very hot and humid Saturday lunch-time in Busan ... Photo of Polymer Division attendees taken in BEXCO forecourt.

APPENDIX 1

Agenda

**Saturday 08.09.2015
09:00 – 17:30**

- 1. Acting President's Introductory Remarks and Finalization of the Agenda**
- 2. Apologies for Absence**
- 3. Approval of the Minutes of the Division Committee Meeting, Istanbul, August 2013**
- 4. Report Interdivisional Subcommittee Materials Chemistry (ISMC) (Chris Ober)**
- 5. Report on the Wikipedia Project (Michael Hess)**
- 6. Report Subcommittee Polymer Terminology - SPT (Roger Hiorns)**
- 7. Report Subcommittee Structure and Properties of Commercial Polymers – SPCP (Jiasong He)**
- 8. Subcommittee Modelling of Polymerization Kinetics and Processes (by proxy Greg Russell)**
- 9. Trends in Polymer Science – STP (Yusuf Yagci)**
- 10. Report Sub-Committee on Polymer Education – SPED (Werner Mormann)**
- 11. Conferences (Greg Russell by proxy)**

**Sunday, 10.08.2015
09:00 – 12:30**

- 12. Report on Division Web Page and Electronic Publications (Claudio dos Santos)**
- 13. Strategy (Sawamoto)**
- 14. The Acting President's Statement (Greg Russell)**
- 15. Accelerating Participation and Leadership of Women in Chemistry (Natalie Stingelin)**
- 16. Future World Polymer Congresses**
- 17. Reports from NR's**
- 18. Report about Nepal (Rameshwar Adhikari)**
- 19. Other Businesses (Greg Russell & participants)**
- 20. Date of Next Meeting (Michael Hess, Roger Hiorns)**
- 21. Closing remarks**

APPENDIX 2

Division Financial and Project Report as of 11 June 2015

Division IV	Total Operations & Commitments Budget	Operations	Actual Operations (Spent)	Remaining Operations	Projects	Actual Commitment	Remaining Project	Total Remaining
Summary	\$49,700.00	30% \$14,910.00	\$4,776.00	\$10,134.00	70% \$34,790.00	\$8,750.00	\$26,040.00	\$36,174.00 73%
Project Commitments	Project Number	Division IV	Division VIII	Project Committee	Samsung	Total Committed		
Date	Balance from 2014	\$6,500.00						
20-May-15	2014-034-2-400 Vert	\$2,250.00	\$2,250.00	\$4,500.00		\$9,000.00		
	Total	\$8,750.00						
(Details of Commitments for information purposes which is included in the summary numbers above).								

Project Numbers	Total Project Budget	2015 Starting Balance	2015 Spent	Remaining Funds	Planned End Date	Completed or Terminated
2003-009-1-400 Wassner	-	-	-	-	30-Jun-2008	
2004-022-3-400 Fitzgerald	\$7,000.00	-	-	-	30-Apr-2007	
2005-011-3-400 Luruli	\$5,000.00	\$2,656.00	-	\$2,656.00	31-Dec-2012	
2006-028-1-400 Vohidal	\$6,000.00	-	-	-	1-Sep-2009	
2007-004-1-400 Handge	\$4,000.00	\$1,575.00	-	\$1,575.00	31-Dec-2014	
2007-008-1-400 dos Santos	\$11,000.00	-	-	-	1-Sep-2012	
2007-058-1-400 Gilbert	\$6,000.00	\$3,336.00	-	\$3,336.00	31-Dec-2013	
2008-015-1-400 Mormann	\$6,000.00	\$98.00	-	\$98.00	30-Jun-2011	
2008-020-1-400 Hodge	\$5,000.00	-	-	-	31-Jul-2014	
2008-028-1-400 Auhl	\$5,000.00	\$5,000.00		\$5,000.00	31-Dec-2015	
2009-019-2-400 Meira	\$5,000.00	\$290.00	-	\$290.00	30-Jun-2015	
2009-047-1-400 Hellwich	\$6,000.00	-	-	-	1-Apr-2013	
2009-050-1-400 Moad	\$5,300.00	\$1,680.00	-	\$1,680.00	30-Sep-2014	
2010-007-1-400 Moad	\$6,000.00	\$530.00	-	\$530.00	30-Sep-2014	
2010-019-1-400 Bucknall	\$5,000.00	\$483.00	-	\$483.00	1-Apr-2014	
2010-027-2-400 Bertin	\$1,000.00	\$1,000.00	-	\$1,000.00	31-Dec-2013	
2010-032-3-400 Mormann	\$9,000.00	\$5,470.00	-	\$5,470.00	30-Sep-2014	
2010-036-1-400 dos Santos	\$2,000.00	-	-	-	31-Dec-2012	
2011-013-2-400 Hess	\$5,360.00	-\$282.00	-	-\$282.00	31-Dec-2013	
2011-033-1-400 Chang/Stept	\$3,000.00	-	-	-	31-Mar-2014	
2012-001-1-400 Ober	\$6,000.00	\$1,705.00	-	\$1,705.00	31-Jan-2015	
2012-027-3-400 Ober	\$6,000.00	\$4,418.00	-	\$4,418.00	1-Mar-2015	
2012-042-1-400 Vert	\$4,500.00	\$988.00	-	\$988.00	31-Dec-2015	
2012-048-3-400 Hiorns	\$6,800.00	\$4,996.00	-	\$4,996.00	1-Jun-2016	

2013-045-1-400 Hutchinson	\$5,000.00	\$5,000.00	-	\$5,000.00	1-Nov-2016	
2013-046-1-400C Kratochvil	\$5,000.00	-	-	-	31-Dec-2014	Completed
2013-047-1-400 Beuermann	\$4,000.00	\$4,000.00	-	\$4,000.00	1-Nov-2016	
2013-049-1-400 Hess	\$2,500.00	\$870.00	-	\$870.00	31-Dec-2014	
2013-051-1-400 Russell	\$6,000.00	\$5,103.00	-	\$5,103.00	1-Nov-2017	
2013-053-1-400 Mormann	\$1,800.00	\$1,800.00	-	\$1,800.00	31-Dec-2014	
2014-014-1-400 Meille	\$4,500.00	\$4,500.00	-	\$4,500.00	1-Sep-2017	
2014-040-1-400 Hess	\$4,000.00	\$4,000.00	\$1,800.00	\$2,200.00	30-Jun-2015	
2014-034-2-400 Vert	\$9,000.00	\$9,000.00	-	\$9,000.00	31-May-2018	

SPECIAL Projects Grants/Royalties	Total Project Budget	2015 Starting Balance	Spent	Remaining Funds
IMACRO Contract	\$60,000.00	\$9,854.00	-	\$9,854.00
Samsung Fund Income	Under Audit Review	\$33,859.00	-	\$33,859.00
Wiley VCH Royalties	\$17,980.00	\$9,468.00	-	\$9,468.00

C - Completed

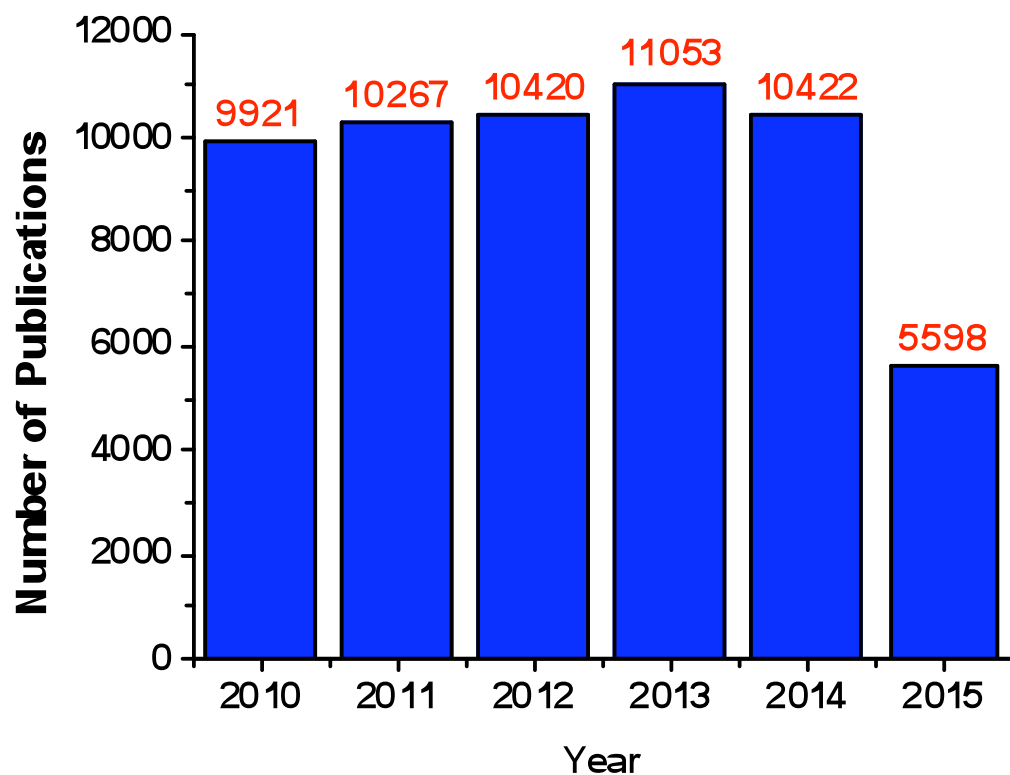
T - Terminated

Yellow - Over Spent

Red (Past End Date)

Gray - Under Audit Review

Publications of Polymer Science from 2010 to 2015



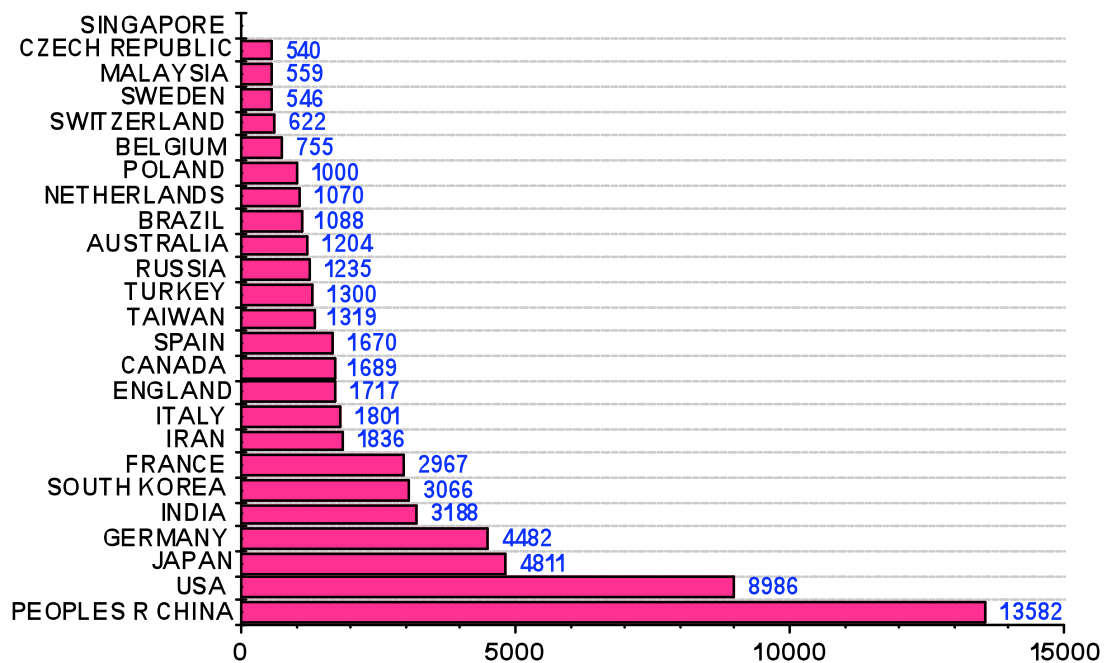
Original Articles = 53,104
Proceedings Paper = 2,400
Review Articles = 1,941
Book Chapter = 1,140

TOTAL = 57,568

*All data taken from ISI-WOS 30.07.2015

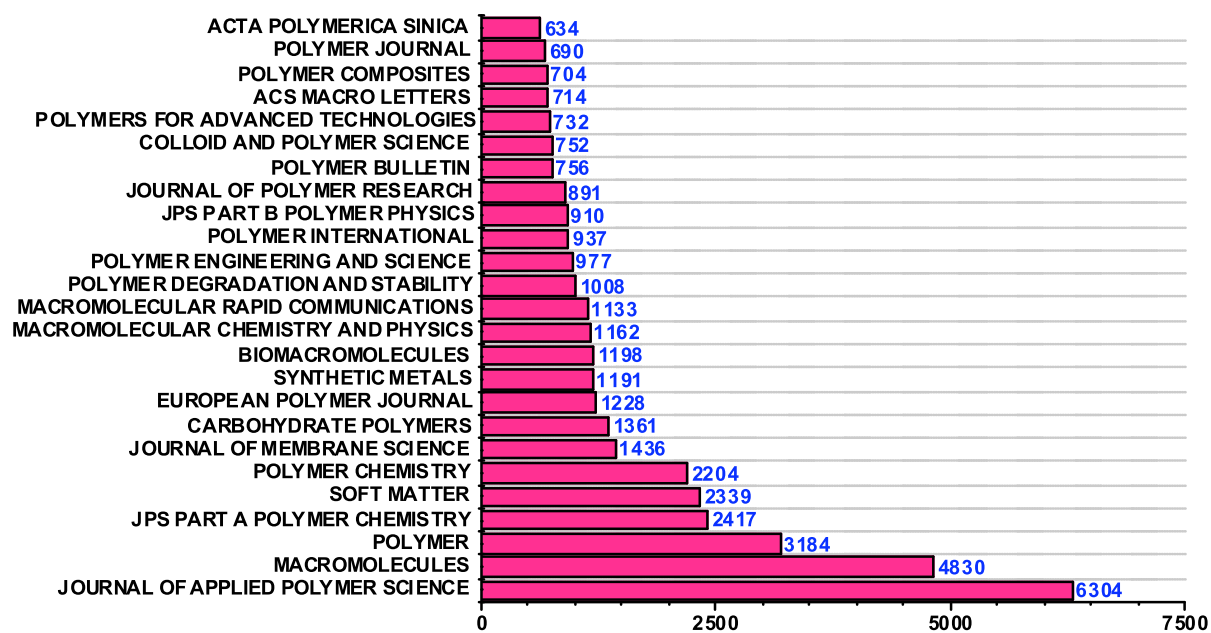
APPENDIX 4

2010-2015 Articles by Countries



APPENDIX 5

2010-2015 Articles by Journals



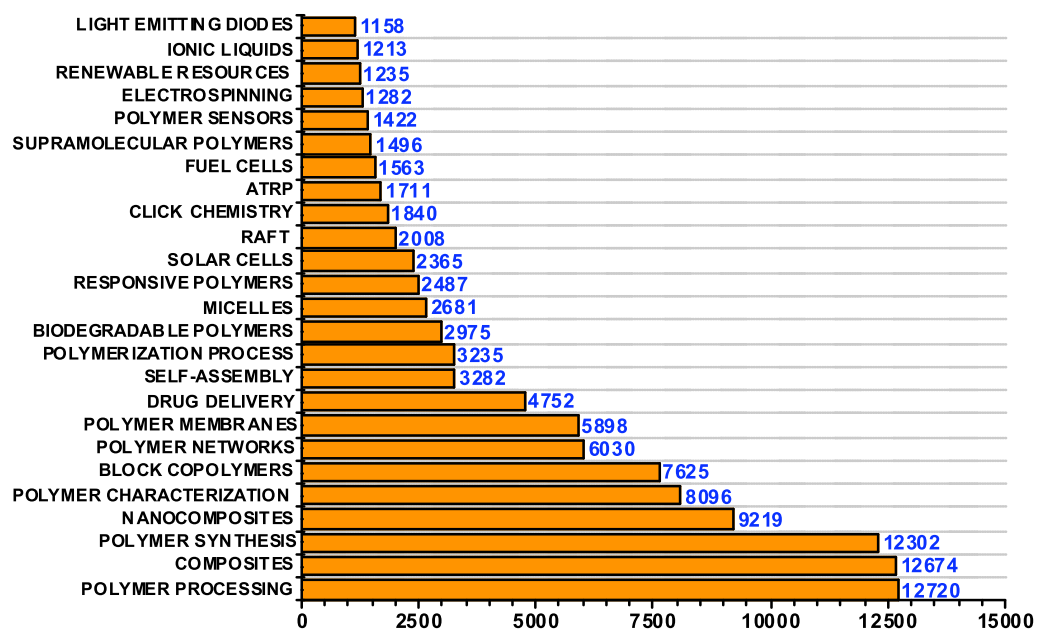
APPENDIX 6

Rank	Abbreviated Journal Title	Total Cit	Articles	Impact Fact	5-Year Impact Fa
1	PROG POLYM SCI	19454	64	26.932	33.343
2	POLYM REV	1388	16	6.156	7.900
3	MACROMOLECULES	101504	950	5.800	5.654
4	ACS MACRO LETT	3481	264	5.764	5.875
5	BIOMACROMOLECULES	31769	489	5.750	6.432
6	POLYM CHEM-UK	10407	747	5.520	5.723
7	J MEMBRANE SCI	45130	825	5.056	5.323
8	MACROMOL RAPID COMM	13256	251	4.941	4.748
9	CARBOHYD POLYM	30889	1162	4.074	4.568
10	SOFT MATTER	27131	966	4.029	4.289
11	MACROMOL BIOSCI	5749	166	3.851	4.012
12	J POLYM SCI POL PHYS	13161	164	3.830	2.990
13	POLYMERS-BASEL	1242	159	3.681	3.904
14	CELLULOSE	5929	388	3.573	4.285
15	INT J POLYM MATER PO	1465	120	3.568	2.376
16	POLYMER	54164	797	3.562	3.910
17	POLYM DEGRAD STABIL	16208	351	3.163	3.722
18	J POLYM SCI POL CHEM	23291	382	3.113	3.007
19	EUR POLYM J	14393	310	3.005	3.198
20	DES MONOMERS POLYM	726	82	2.780	2.000
21	EXPRESS POLYM LETT	1938	84	2.761	2.932
22	MACROMOL MATER ENG	3687	136	2.661	2.779
23	MACROMOL CHEM PHYS	9868	246	2.616	2.377
24	REACT FUNCT POLYM	5146	148	2.515	2.535
25	PLASMA PROCESS POLYM	2799	116	2.453	2.417
26	POLYM INT	6672	256	2.409	2.340
27	J BIOACT COMPAT POL	1104	43	2.352	2.558
28	SYNTHETIC MET	14376	355	2.252	2.244
29	POLYM TEST	4409	178	2.240	2.322
30	ADV POLYM SCI	4152	37	1.992	3.383
31	J POLYM RES	2700	220	1.920	1.907
32	COLLOID POLYM SCI	6434	330	1.865	2.005
33	CHINESE J POLYM SCI	1183	184	1.835	1.402
34	IRAN POLYM J	1371	99	1.806	1.708
35	J APPL POLYM SCI	47314	1483	1.768	1.662
36	EUR PHYS J E	3586	113	1.757	1.831
36	POLYM ADVAN TECHNOL	4716	212	1.757	2.007
38	J POLYM ENVIRON	2128	63	1.671	2.061
39	MACROMOL THEOR SIMUL	1144	49	1.667	1.559
40	J CELL PLAST	522	25	1.661	1.489
41	POLYM J	3426	122	1.653	1.489
42	J BIOMAT SCI-POLYM E	3795	133	1.648	1.852
43	MACROMOL REACT ENG	569	61	1.642	1.803
44	POLYM COMPOSITE	4200	275	1.632	1.606
45	MACROMOL RES	2108	192	1.597	1.499
46	POLYM ENG SCI	9306	315	1.520	1.608
47	J REINF PLAST COMP	2737	188	1.503	1.323
48	POLYM BULL	3984	204	1.438	1.587

49	HIGH PERFORM POLYM	944	117	1.286	1.151
50	INT J POLYM ANAL CH	476	66	1.264	1.150
51	INT J POLYM SCI	332	79	1.195	1.679
52	J INORG ORGANOMET P	1384	135	1.160	1.248
53	J PHOTOPOLYM SCI TEC	970	132	1.055	0.795
54	ADV POLYM TECH	862	84	1.045	1.215
55	POLYM SCI SER C+	127	10	1.037	0.864
56	RUBBER CHEM TECHNOL	2348	47	1.024	0.983
57	POLYM SCI SER A+	1395	102	0.919	0.767
58	FIBER POLYM	1689	360	0.881	1.146
59	KOREA-AUST RHEOL J	359	44	0.875	0.839
60	J VINYL ADDIT TECHN	424	37	0.859	1.099
61	J MACROMOL SCI A	2374	122	0.809	0.837
62	J ELASTOM PLAST	318	46	0.773	0.777
63	J MACROMOL SCI B	1590	141	0.740	0.791
64	ACTA POLYM SIN	920	210	0.641	0.483
65	POLIMERY-W	601	99	0.633	0.600
66	PLAST RUBBER COMPOS	580	46	0.583	0.654
67	POLYM SCI SER B+	457	108	0.577	0.578
68	E-POLYMERS	469	46	0.569	0.378
69	POLYM-KOREA	393	120	0.528	0.413
70	INT POLYM PROC	544	72	0.512	0.598
71	POLIMEROS	622	113	0.474	0.759
72	MECH COMPOS MATER	838	77	0.473	0.575
73	J POLYM ENG	238	98	0.465	0.428
74	PROG RUBBER PLAST RE	40	16	0.452	0.301
75	CELL POLYM	196	13	0.423	0.405
76	NIHON REOROJI GAKK	136	39	0.356	0.323
77	SEN-I GAKKAISHI	330	110	0.315	0.236
78	J POLYM MATER	239	29	0.308	0.325
79	POLYM POLYM COMPOS	335	117	0.271	0.311
80	J RUBBER RES	173	20	0.225	0.198

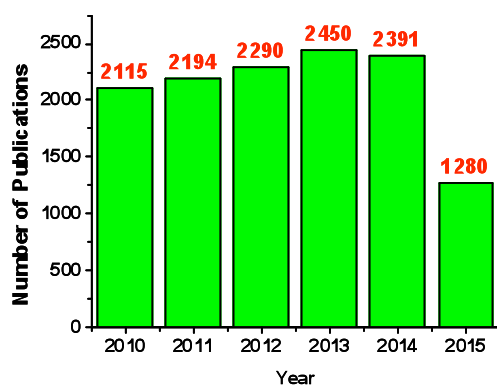
APPENDIX 7

Articles by Selected Topics

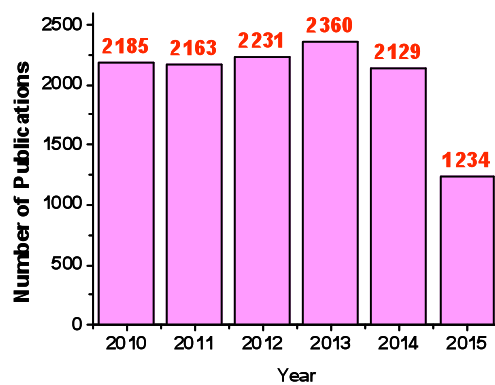


APPENDIX 8

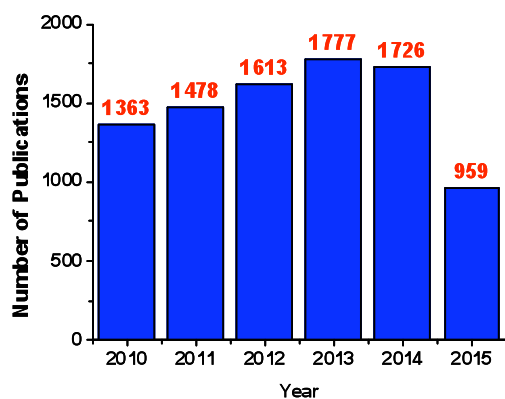
Processing



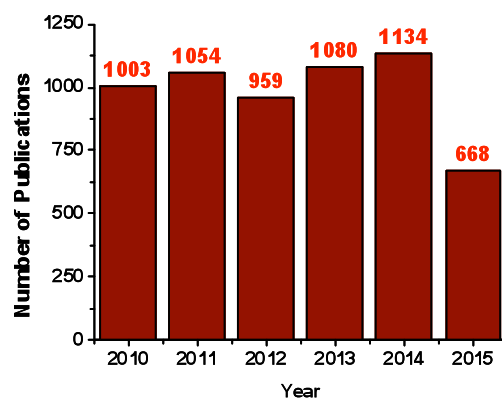
Synthesis



Nanocomposites

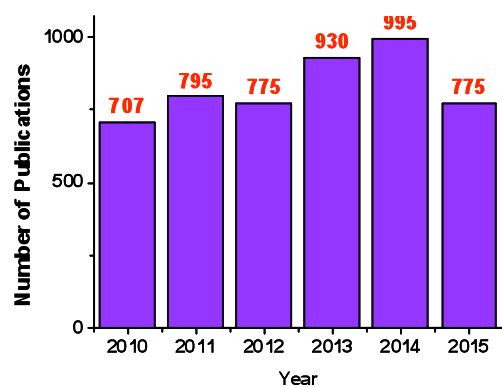


Membranes

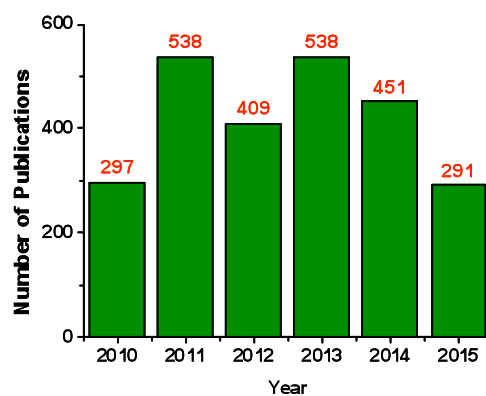


APPENDIX 9

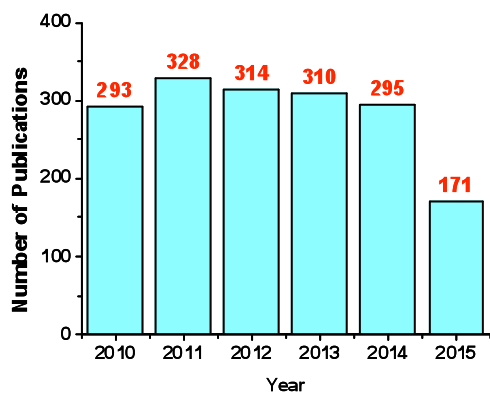
Drug Delivery



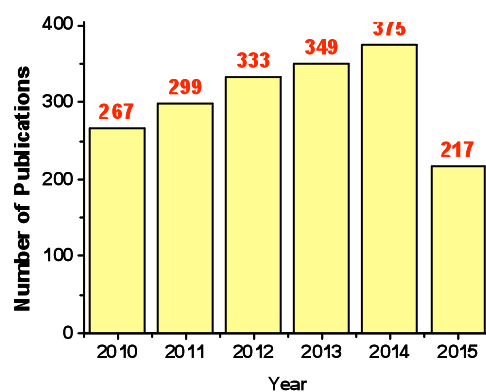
Solar Cells



ATRP



Click Chemistry



APPENDIX 10

Subcommittee on Modelling of Polymerization Kinetics and Processes

Publications and citations to June 22nd 2014 (first number) and to June 22nd 2015 (second)

In total there are 2463 citations (an increase of 121 within the last year)

“Consistent values of rate parameters in free radical polymerization systems” **161 → 161 citations**

M. Buback, L. H. Garcia-Rubio, R. G. Gilbert, D. H. Napper, J. Guillet, A. E. Hamielec, D. Hill, K. F. O'Driscoll, O. F. Olaj, J. Shen, D. Solomon, G. Moad, M. Stickler, M. Tirrell, M. A. Winnik, *J. Polym. Sci., Polymer Letters Ed.* 26, 293-297 (1988).

“Consistent values of rate parameters in free radical polymerization systems. Part II: Outstanding dilemmas and recommendations” **200 → 201 citations**

M. Buback, R. G. Gilbert, G. T. Russell, D. J. T. Hill, G. Moad, K. F. O'Driscoll, J. Shen, M. A. Winnik, *J. Polym. Sci., Polym. Chem. Ed.* 30, 851-863 (1992).

“Consistent values of rate parameters in free-radical polymerization systems” **36 → 37 citations**

R. G. Gilbert, *Pure App. Chem.* 64, 1563-1567 (1992).

“Critically evaluated rate coefficients for free-radical polymerization, I. Propagation rate coefficients for styrene” **526 → 540 citations**

M. Buback, R. G. Gilbert, R. A. Hutchinson, B. Klumperman, F.-D. Kuchta, B. G. Manders, K. F. O'Driscoll, G. T. Russell, J. Schweer, *Macromol. Chem. Phys.* 196, 3267-3280 (1995).

“Critically evaluated rate coefficients for free-radical polymerization, 2. Propagation rate coefficients for methyl methacrylate” **400 → 415 citations**

S. Beuermann, M. Buback, T. P. Davis, R. G. Gilbert, R. A. Hutchinson, O. F. Olaj, G. T. Russell, J. Schweer, A. M. van Herk, *Macromol. Chem. Phys.* 198, 1545-1560 (1997).

“Critically-evaluated propagation rate coefficients in free radical polymerizations. Styrene and methyl methacrylate” **106 → 108 citations**

R. G. Gilbert, *Pure Appl. Chem.* 68, 1491-1494 (1996).

“Critically evaluated rate coefficients for free-radical polymerization - 3. Propagation rate coefficients for alkyl methacrylates” **162 → 175 citations**

S. Beuermann, M. Buback, T.P. Davis, R.G. Gilbert, R.A. Hutchinson, A. Kajiwar, B. Klumperman, and G.T. Russell, *Macromol. Chem. Phys.* 201, 1355-1364 (2000).

“Critically evaluated rate coefficients for free-radical polymerization, 4. Propagation rate coefficients for methacrylates with cyclic ester groups” **61 → 66 citations**

S. Beuermann, M. Buback, T. P. Davis, N. García, R. G. Gilbert, R. A. Hutchinson, A. Kajiwar, M. Kamachi, I. Lacík, G. T. Russell, *Macromol. Chem. Phys.* 204, 1338-1350 (2003).

“Critically evaluated rate coefficients for free-radical polymerization, 5. Propagation rate coefficient for butyl acrylate” **190 → 213 citations**

J. M. Asua, S. Beuermann, M. Buback, P. Castignolles, B. Charleux, R. G. Gilbert, R. A. Hutchinson, J. R. Leiza, A. N. Nikitin, J.-P. Vairon, A. M. van Herk, *Macromol. Chem. Phys.* 205, 2151-2160 (2004).

“Critically evaluated rate coefficients for free-radical polymerization, Part 6. Propagation rate coefficient of methacrylic acid in aqueous solution” **30 → 35 citations**

S. Beuermann, M. Buback, P. Hesse, F.-D. Kuchta, I. Lacík, A. M. van Herk, *Pure Appl. Chem.* 79, 1463-1469 (2007).

“Determination of the Propagation Rate Coefficient of Vinyl Pivalate based on EPR Quantification of Propagating Radical Concentration” **1 → 3 citation**

N. Kubota, A. Kajiwar, P. B. Zetterlund, M. Kamachi, J. Treurnicht, M. P. Tonge, R. G. Gilbert, B. Yamada, *Macromol. Chem. Phys.* 208, 1403-1411 (2007).

“Critically evaluated rate coefficients for free-radical polymerization, 7. Secondary-radical propagation rate coefficient

for methyl acrylate in bulk” **2 → 10 citations**

C. Barner-Kowollik, S. Beuermann, M. Buback, P. Castignolles, B. Charleux, M. L. Coote, R. A. Hutchinson T. Junkers, I. Lacik, G. T. Russell, M. Stach, A. M. van Herk, *Polym. Chem.* 4, 204-212 (2014).

“Critically evaluated termination rate coefficients for free-radical polymerization – 1. The current situation”

115 → 122 citations

M. Buback, M. Egorov, V. Kaminsky, O. F. Olaj, G. T. Russell, P. Vana, G. Zifferer, *Macromol. Chem. Phys.* 203, 2570-2582 (2002).

“Critically evaluated termination rate coefficients for free-radical polymerization, 2. Experimental methods”

78 → 84 citations

C. Barner-Kowollik, M. Buback, M. Egorov, T. Fukuda, R. G. Gilbert, A. Goto, G. T. Russell, P. Vana, B. Yamada, P. B. Zetterlund, *Prog. Polym. Sci.* 30, 605-643 (2005).

“Mechanism and Kinetics of Dithiobenzoate-Mediated RAFT Polymerization, 1. The Current Situation”

274 → 293 citations

C. Barner-Kowollik, M. Buback, B. Charleux, M. L. Coote, M. Drache, T. Fukuda, A. Goto, B. Klumperman, A. B. Lowe, J. B. McLeary, G. Moad, M. J. Monteiro, R. D. Sanderson, M. P. Tonge, P. Vana, *J. Polym. Sci. Polym. Chem.* 44, 5809-5831 (2006).

Summary:

The most successful documents are on the following monomers:

Monomer	Journal	Year	Web of Science Citations (Jun 22, 2015)
1. Styrene	<i>Macromol. Chem. Phys.</i>	1995	540
2. Methyl Methacrylate	<i>Macromol. Chem. Phys.</i>	1997	415
3. Alkyl Methacrylates	<i>Macromol. Chem. Phys.</i>	2000	175
4. Functional Methacrylates	<i>Macromol. Chem. Phys.</i>	2003	66
5. <i>n</i> -Butyl Acrylate	<i>Macromol. Chem. Phys.</i>	2004	213
6. Methacrylic Acid	<i>Pure Appl. Chem.</i>	2007	35
7. Methyl Acrylate	<i>Polym. Chem.</i>	2014	10
8. Vinyl Acetate (new)	<i>on-going project</i>		