

IUPAC Polymer Division (IV) - Report to Bureau April 2020

By Christine Luscombe – President of Division IV

I. Highlights and/or Executive Summary:

The Polymer Division continues to be productive in its activities. As ever, in 2019, new projects were started and old projects were finished. Most projects led to publications, which included recommendations. New members arrived with some old members taking more of a backseat. Meetings took place and future meetings were planned. Conferences were approved for IUPAC endorsement, which I believe continue to be greater than other Divisions within IUPAC. Here are some of our key achievements.

- Over 10 publications published
- 14 conferences/workshops endorsed
- Preparation for the celebration of 100th anniversary of the term Macromolecules as coined by Staudinger – publication of a viewpoint “Abetz, V.; Chan, C. H.; Luscombe, C. K.*; Matson, J. B.; Merna, J.; Nakano, T.; Raos, G.; Russell, G. T.*” ["Quo Vadis, Macromolecular Science? Reflections by the IUPAC Polymer Division on the Occasion of the Staudinger Centenary"](#) Isr. J. Chem., 2020, 60, 9-19.

Increasing visibility of the Division outside IUPAC – Within the polymer community at large, especially amongst the younger generation of scientists, an image remains that what the Division works on is outdated because what we are primarily known for is development of complex, and what are occasionally considered to be irrelevant, rules for polymer terminology. We are working on rectifying this image. One first attempt was the publication of an [Editorial](#) in the leading polymer journal, *Macromolecules*, that summarized the work that we that IUPAC does as a whole but also what the Polymer Division does. We are also working on a follow-up document, a “dilemma document” in *Polymer Chemistry*, which is another premier polymer journal, discussing current dilemmas we face in polymer terminology in an attempt to engage the polymer community at large. Readers will be asked to send responses to *Polymer Chemistry* and we will establish recommendations based on the responses. We continue to work towards recruiting new members to the Division with diversity and inclusion in mind. With regards to this, we have established guidelines for our endorsed conferences that the invited speaker list and advisory boards must show diversity.

Increasing revenue for the Division - In past years, we have used conference proceedings as a means to increase revenue for our division. However, during the years, the historical rule of publishing the conference contributions in Wiley’s Macromolecular Symposia has been decaying mainly due to low impact of this journal and delayed publishing compared to other journals. Therefore this rule was decided not to be imposed on the conference organizers. Currently, the PD has awards that are externally funded by DSM, *Polymer International* and Hanwha-Total (formerly Samsung). It also has *IUPAC Poster Prizes*, which are awarded for the best three student posters at every World Polymer Congress. We are currently exploring the use of social media (eg. setting up a YouTube channel) through the Subcommittee of Polymer Education to see if this could be a viable means to obtain funds for the Division. In order to be eligible to monetize a YouTube account, one must have 1000 subscribers. It is estimated that a social media influencer with at least 100,000 subscribers on YouTube can get an average of \$12,500 for a sponsored post. It would be tough to get as many as 100,000 subscribers but we do believe that a 1000 subscribers would be a

modest goal to begin with. We are currently investigating if this is a realistic way to increase both visibility but also revenue for the Division.

Establishing emeritus members – As new members join and the older members take a step back, we have a growing number of disgruntled members that the establishment of the emeritus status is taking too long. We look forward to receiving guidelines from the Bureau to formalize the process of creating an emeritus status.

II. Plans and priorities for this biennium, and beyond:

As I write this section on April 4th 2020, entering week 4 of working at home and knowing that our stay-at-home order in Seattle, WA is in place till at least May 4th 2020, our plans and priorities have shifted significantly since how we started 2020. Our current focus is now how to maintain our activities with the COVID-19 situation evolving around us. 2020 started with the Bureau mandating us to figure out ways to operate with a limited budget. Perhaps, luckily for the Bureau, our travel has been curtailed. Division IV was one of the Divisions which already operated using recommendations provided by the Bureau, which was to combine our annual meetings with a major conference and to use funds from task group projects to help support travel costs. However, our flagship conference that occurs on the off-years from the General Assembly and World Chemistry Congress, the World Polymer Congress (more popularly called the Macro conference) has now been postponed. The conference was originally supposed to happen in July 5-9, 2020 but now is scheduled to occur on May 16-20, 2021. Whether or not the pandemic would have resolved itself by May 2021 remains to be seen.

Regardless, much of our project work on our off-years happened during the week prior to the Macro conference where the Subcommittee on Polymer Terminology and Subcommittee on Polymer Education would hold meetings over a 4-day period, followed by a Division wide 2-day meeting. For this year, we have chosen not to wait till the 2021 Macro meeting and are in the process of drawing up plans as to how we will run our meetings over the 6-day period through online meetings. It was felt that if it was left to TGLs to organize their own meetings or perform work in their own time, desirable amount of progress would not occur on many of the projects based on past experience. We also wanted a way to ensure that our high level of comradery was maintained during these difficult times by have face-to-face meetings even if they were virtual. Here are our current considerations:

Problems:

- i. Time zones present issues, and each project has its own needs (some might prefer just email exchange, some need extensive meetings, etc.)
- ii. We need time where everyone is together for SPT and PD business meeting elements

Solutions:

- i. We may suggest a timetable to everyone for task group meetings, as we usually do. We will stick to the original dates of June 30 to July 3.
- ii. We will have two full SPT meetings, one at the beginning and one at the end of the week where we get project updates from each TGL, in addition to an overall PD meeting.
- iii. Full SPT team meetings and PD meetings by zoom would be doable, but we need to keep them to an hour due to timezone issues. (Best time of day is probably 8:00 am EST (5:00 am PST, 2:00 CET, 8:00 pm in China, 11:00 pm in Australia, 1:00 am in New Zealand) on Tues June 30, 2020 and at the same time on Fri July 03, 2020).

We still plan to have in-person PD meetings prior to Macro 2021 in May although they will be curtailed and we are asking that our members prioritize attending the General Assembly in Montreal.

Other activities that are on our priority list:

- Formalizing our Emeritus membership
- Continue developing interdivisional projects. We are particularly excited with the project related to microplastics which is described below.

III. An overall report of Division/Committee activities and achievements during the 2018-2019 biennium *organized by the Goals and Objectives laid out in the current IUPAC Strategic Plan*

GOALS

Provide scientific expertise to address critical world needs.

Within Division IV, we aim to provide scientific expertise to address critical world needs through the activities of the Subcommittee on Polymer Terminology, on Modeling of Polymerization Kinetic and Processes, and on Structure and Properties of Commercial Polymers.

Modeling and mechanistic studies into free-radical polymerizations are important for science and industry, but often completely different model assumptions and parameter values are reported for ostensibly the same systems. The projects of the IUPAC Subcommittee “Modeling of Polymerization Kinetics and Processes” are to rectify this situation through international collaboration, by producing critically evaluated kinetic parameters, whose values are reliable and which can be used by the international polymer community. Moreover, reliable methodologies have been established by the IUPAC Subcommittee. Benchmark propagation rate coefficients, k_p , have been obtained for styrene, many methacrylates, butyl and methyl acrylate, vinyl acetate, and methacrylic acid by critical evaluation and also by independent experiments. These efforts were extended to termination rate coefficients, initiation rate parameters, and reversible-deactivation radical polymerization kinetics. Currently, the backbiting reaction in acrylate systems and the proper data evaluation in copolymerizations are under consideration. In addition, a machine accessible databank for kinetic coefficients is developed.

The aim of the Subcommittee on Structure and Properties of Commercial Polymers is to operate an international network of scientists whose interests lie within the broad field of structure and properties of commercial polymers. Drivers of this activity are its members and their motivation to obtain value (to them and their business) from participation in the group. Format and mode of operation were reviewed in 1983 by its former chair Clegg (P. L. Clegg, *Pure Appl. Chem.* 55 (1983) 755-764; <https://doi.org/10.1351/pac198355050755>). The group meets at least once per year and defines projects on which at least a significant part of the members agrees to work on and to commit resources. The projects have a particular scientific target and have been mainly experimental in nature. Co-ordinators guide the projects to the final publication(s). The projects conducted by the Sub-committee are funded by the participants and in turn their organizations. The Sub-committee initiates projects that it knows are of relevance and importance. The balanced membership base from industry and academy works in a manner to ensure that the projects are structured in such a way as to accommodate value in application, need and scientific novelty. Also, in a general sense this has to be convincing to their paymasters who are their industrial managers

or academic supervisors. It is therefore obligatory to ensure that the appropriate skills are present and active in the Sub-committee.

Increase the value of our products and services.

Division IV seeks to increase the value of our products and services by working closely with our stakeholders. The Subcommittee on Structure Properties of Commercial Polymers embodies this idea where much of the work is done in collaboration with industry. Furthermore, the work done by the Subcommittee on Modeling of Polymerization Kinetic and Processes is a collaborative effort with those in academia and their publications are frequently cited because they provide a standard for the polymer community as a whole.

Improve the vitality, effectiveness and efficiency of our Union.

The vitality, effectiveness, and efficiency of our Union are promoted by the Polymer Division and its Subcommittees by meeting at least once a year in person but also through the use of Skype, and Zoom conferencing. Our activities are promoted through the use of social media with the use of Twitter growing.

OBJECTIVES

Brand IUPAC in the minds of stakeholders

Much of our branding comes in the form of conferences. The conferences recommended for endorsement by the Polymer Division IUPAC are focused on the contemporary and emerging fields in polymer science, technology, materials, as well as in interdisciplinary sciences (biomedicine, biophysics, biotechnologies, electronics, environment, etc.) with the polymer science playing an inevitable role. The reviews of

The conferences routinely endorsed by the Polymer Division IUPAC include IUPAC World Polymer Congress, that is a flagship conference of the Polymer Division IUPAC organized biannually, International Symposium on Ionic Polymerization, International Symposium on Macromolecular-Metal Complexes, International Conference on Polymer Characterization (Poly-Char), International Conference on Polymers and Organic Chemistry, UNESCO School & IUPAC Conference on Macromolecules, Novel Materials and Their Synthesis and Prague Meetings on Macromolecules.

In addition to these routine conferences, other conferences or conference series apply for the IUPAC endorsement. Overall, Polymer Division IUPAC endorses about 10 conferences a year. The discussions have been ongoing whether this number is optimal considering an increased number of conferences globally. In the case if this number is suboptimal, the mechanism to increase the number of endorsed conferences should be proposed to enhance both the recognition and impact the Polymer Division IUPAC. This issue should perhaps be discussed interdivisionally. The Applications for IUPAC Endorsement are typically at a high level. The feedback to the organizers is given after reviewing the applications by Igor Lacik, the current vice-president of Polymer Division IUPAC, in communication mainly with Fabienne Meyers. In the case of interdivisional applications, the reviewing process also involves reviewers from other divisions.

The unusual situation has been encountered in 2020. The Macro2020 47th World Polymer Congress in South Korea, Jeju Island, planned at the beginning of July 2020, has been cancelled due to the COVID-19 pandemic. The new date has recently been announced in May 2021. There

are several other conferences which have already been cancelled in 2020 and postponed, and a few conferences organized in May – July 2020 are planned only provisionally.

Improve quality and frequency of communication with stakeholders

In Division IV, we continue to maintain communication with our stakeholders through our recommendations and other publications, as well as through our flagship conference, the World Polymer Congress, which has become popularly known as the Macro series. Within the Division, communication is maintained through a Division-wide WhatsApp group, which not only helps to communicate Division business, but also helps to build camaraderie.

Increase revenue

In past years, we have used conference proceedings as a means to increase revenue for our division. However, during the years, the historical rule of publishing the conference contributions in Wiley's Macromolecular Symposia has been decaying mainly due to low impact of this journal and delayed publishing compared to other journals. Therefore this rule was decided not to be imposed on the conference organizers. Currently, the PD has awards that are externally funded by DSM, *Polymer International* and Hanwha-Total (formerly Samsung). It also has *IUPAC Poster Prizes*, which are awarded for the best three student posters at every World Polymer Congress. We are currently exploring the use of social media (eg. setting up a YouTube channel) through the Subcommittee of Polymer Education to see if this could be a viable means to obtain funds for the Division. In order to be eligible to monetize a YouTube account, one must have 1000 subscribers. It is estimated that a social media influencer with at least 100,000 subscribers on YouTube can get an average of \$12,500 for a sponsored post. It would be tough to get as many as 100,000 subscribers but we do believe that a 1000 subscribers would be a modest goal to begin with.

Expand and retain Member and volunteer base with an emphasis on diversity and inclusion

We are extremely lucky in our Division in that we have been able to build extremely close friendships over the years between Division members. This has really been facilitated by the fact that we hold both the Subcommittee on Polymer Terminology meetings as well as the Polymer Division meetings with our flagship conference, which are the Macro conferences. Holding these meetings together has meant that we spend two weeks together every other year, and whether we like it or not, we get to know each other extremely well. This has made it easy for us to retain, for examples, the Young Observers. When we recruit new members, decisions are made based on diversity.

Enhance interdivisional interaction and collaboration

We have a number of projects that our interdivisional. For example, we have a joint project with the Committee on Chemical Education, this involves pairing academics in chemical education with researchers in polymer science to produce a special issue of the journal 'Chemistry Teacher International' (itself an IUPAC project, 2016-002-4-050) based on the content of educational workshops delivered at polymer conferences as part of other IUPAC projects (e.g., 2017-029-2-400). We maintain an active number of projects with Division VIII through our work within the Subcommittee on Polymer Terminology. We are working closely with others on our contributions to the Gold Book. Finally, we are embarking on a project related to microplastics as described below.

Emphasize multidisciplinary projects addressing critical global issues

A prime example of our activities that represent this is related to our involvement in a project entitled “The environment, health, and food safety impact of microplastics” driven by the Chemistry and Environment Division. The project brings together 5 IUPAC Divisions. The total sum of USD 13,000 has been allocated for the project over its lifetime of 3 years, and with contribution of USD 6500 from Division VI, USD 2000 from Div V, and USD 1500 from each Div III, Div IV, and Div VII. The goal of this project is to provide scientists, policy makers, regulators, industry and general public a full picture and better understanding on the emerging issue of microplastics by analyzing the existing data, reviewing the scientific methods, tracing the source, revealing the fate, and evaluating the impact on environment and food safety, aiming to recommend future efforts to solve this globally challenging problem.

Support chemistry education, particularly in developing countries

Division IV activities for chemistry education are led by the Subcommittee for Polymer Education. The Chair of the Subcommittee is Chris Fellows (The University of New England, Australia - cfellows@une.edu.au) and the Secretary is Melissa Chin Han Chan (Universiti Teknologi MARA, Malaysia - cchan_25@yahoo.com.sg). There are 29 other members of the Subcommittee, representing Australia, Brazil, China (Beijing), China (Taipei), Czech Republic, Germany, Italy, Japan, Korea, Nepal, New Zealand, Qatar, Russia, South Africa, United Kingdom, and United States of America. Bimonthly Skype meetings of the Subcommittee have been well attended over the past year, with almost all members attending at least one meeting.

The Subcommittee on Polymer Education has seven current projects.

2019-035-1-050 Special issue of Chemistry Teacher International in Polymer Sciences

A joint project with the Committee on Chemical Education, this involves pairing academics in chemical education with researchers in polymer science to produce a special issue of the journal ‘Chemistry Teacher International’ (itself an IUPAC project, 2016-002-4-050) based on the content of educational workshops delivered at polymer conferences as part of other IUPAC projects (e.g., 2017-029-2-400).

2019-022-1-400 Educational Workshop in Polymer Sciences 2020

Following up on successful workshops held earlier at the MACRO 2018 meeting in Cairns (2017-029-2-400), the POLYCHAR meeting in Kuala Lumpur (2015-057-1-400) and the MACRO 2016 meeting in Istanbul, it was planned to have a half-day educational workshop with a primary audience of postgraduate students at MACRO 2020 on Jeju. This workshop will now almost certainly be delayed until 2021 or 2022.

2018-038-1-400 Hands-on training on Wikipedia and Wikidata for application of IUPAC terms across Wikipedia

A successful week of training was carried out in Milan with updates to 50+ polymer related pages on Wikipedia and work done with the aim of making the Polymer article a ‘feature’ article. Two more training courses were planned for this June-July but have been postponed.

2018-031-1-4002 3rd UNESCO/IUPAC Postgraduate Course in Polymer Science

A recurring series of IUPAC project providing postgraduate training in Prague for students from less developed countries, this has been very successful. It has now been decided that the program is mature and once this project is closed there will be no more submissions in this series.

2017-019-2-400 An International Exercise-Based Syllabus in Polymer Chemistry

Intended to create a resource for teachers and students in less developed countries, providing the ‘skeleton’ of a textbook with enough exercises to support an undergraduate course of study in polymer chemistry. A first draft of the syllabus is very close to completion.

2015-032-2-400 Synchronizing Wikipedia: Polymer Definitions and Terminology

This project led over the past few years to numerous new and updated polymer-related Wikipedia pages containing IUPAC definitions and the follow up project 2018-038-1-400. The project is in the process of being closed.

2012-027-3-400 Enhancing Educational Website for Polymer Chemistry

Website development and maintenance is an ongoing process for all organisations, which has been disrupted somewhat in the case of the Subcommittee's educational website by the transition to a centralised IUPAC website management structure. This project is in the process of being closed.

IV. Tabular material. Please also see Appendix 3 for tabular material from the Subcommittee of Polymer Terminology

Publications

- Yujing Tang, Minqiao Ren, Liping Hou, Jianfang Sheng, Meifang Guo, Hongwei Shi, Liangshi Wang, Jinliang Qiao Effect of Microstructure on Soluble Properties of Transparent Polypropylene Copolymers, *Polymer*, 2019, 183, 121869.
- Dong Lyu, Yujing Tang, Li Qian, Ran Chen, Ying Lu, Yongfeng Men Large-Strain-Cavitation Induced Stress Whitening in Propylene-Butene-1 Copolymer during Stretching, *Polymer*, 2019, 167, 146-153
- Ruihua Lv, Yucheng He, Kefeng Xie, Wenbing Hu Crystallization rates of moderate and ultra-high molecular weight polyethylene characterized by Flash DSC measurement. *Polymer International*, 2020, 69, 18-23.
- Ruihua Lv, Yucheng He, Jiping Wang, Jie Wang, Jian Hu, Jianming Zhang, Wenbing Hu Flash DSC study on the annealing behaviors of poly(L-lactide acid) crystallized in the low temperature region. *Polymer*, 2019, 174, 123-129.
- "A Critical Assessment of the Kinetics and Mechanism of Initiation of Radical Polymerization with Commercially Available Dialkyldiazene Initiators", G. Moad, *Prog. Polym. Sci.* 88, 130 (2019).
- "Critically evaluated rate coefficients in radical polymerization, 8. Propagation rate coefficients for vinyl acetate in bulk", C. Barner-Kowollik, S. Beuermann, M. Buback, R. A. Hutchinson, T. Junkers, H. Kattner, B. Manders, A. N. Nikitin, G. T. Russell, A. M. van Herk, *Macromol. Chem. Phys.* 218, 1600357 (2017)
- "Critically evaluated propagation rate coefficients for radical polymerizations: acrylates and vinyl acetate in bulk (IUPAC Technical Report)", R. A. Hutchinson, S. Beuermann, *Pure Appl. Chem.* 91(11), 1883 (2019)

Symposia

1. Symposia of IUPAC project "Structure and Properties of Transparent Polypropylene with Very Low Solubles", held in Beijing (China), September 4th, 2019.

Conferences

Below is the list of Applications for IUPAC Endorsement reviewed in 2019 and 2020:

1. 23rd International Conference on Phosphorus Chemistry (ICPC23), May 31 - June 4 2020, Ningbo, China (<http://www.icpc23.org/>); the conference has been postponed to 2023 due to COVID-19
2. 44th International Conference on Coordination Chemistry (ICCC 2020), July 5 – 10 2020, Rimini, Italy (<https://www.iccc2020.com/>); the conference has been postponed to 2021 due to COVID-19

3. Chemistry Conference for Young Scientists 2020, February 19 - 21 2020, Blankenberge, Belgium (<http://www.chemcys.be>)
4. 6th European Symposium on Photopolymer Science, 6-9 September 2020, Istanbul, Turkey (<http://www.esps2020.org/>)
5. Frontiers in Chemical Technology, June 17 – 19 2020, Colombo, Sri Lanka (<http://www.web.ichemc.edu.lk/fct/>)
6. IUPAC Macro 2022 49th World Polymer Congress, July 17 – 22 2022, Winnipeg, Manitoba, Canada (<https://iupac.org/event/48th-world-polymer-congress-macro2020/>)
7. 10th International Symposium “Molecular Order and Mobility in Polymer Systems”, 18-22 05 2020, Saint-Petersburg, Russia (<https://iupac.org/event/10th-international-symposium-on-molecular-order-and-mobility-in-polymer-systems/>); the conference has been postponed to 2021 due to COVID-19,
8. NICE (Nature Inspires Creativity Engineers) 2020, October 11-14 2020, Nice, France (<https://www.nice-conference.com/>)
9. 84th Prague Macromolecular Meeting Frontiers of Polymer Colloids: From Synthesis to Macro-scale and Nano-scale Applications, July 12 – 16 2020, Prague, Czechia (<https://www.imc.cas.cz/sympo/84pmm/>)
10. International Polymer Characterization Forum (IPCF) POLY-CHAR 2020, May 18-22, 2019, Venice, Italy (www.poly-char2020.org)
11. Polymers 2020: New Trends in Polymer Science: Health of the Planet, Health of the People, June 3–5 2020, Turin, Italy (<https://polymers2020.sciforum.net/>)
12. 13th Conference on Polymer-Solvent Complexes and Intercalates, November 10-13 2020, Toyonaka, Japan (<http://www.chem.sci.osaka-ac.jp/graduate/mms/polysolvat13/>)
13. Italian-French International Conference on Magnetic Resonance, September 21-24 2020, Milan, Italy (<https://iupac.org/event/italian-french-international-conference-on-magnetic-resonance/>)
14. POLY-CHAR 2021 World Forum on Advanced Materials and Short Course on Polymer Characterization, January 25 – 29 2021, Auckland, New Zealand (tba)

Appendix I

Recent activities of the Polymer Division Subcommittee on Modeling of Polymerization Kinetics and Processes

Sabine Beuermann and Robin Hutchinson

March 2020

Membership

Co-chairs: S. Beuermann (Clausthal, D), R. A. Hutchinson (Kingston, CAN)

Members: C. Barner-Kowollik (Brisbane, AUS), M. Buback (Göttingen, D), M. Busch (Darmstadt TU, D), P. Castignolles (Western Sydney, AUS), M. Coote (Canberra, AUS), D. D'hooge (Ghent, BE), M. Drache (Clausthal, D), C. Fellows (Sydney, AUS), M. Gaborieau (Western Sydney, AUS), A. Goto (Kyoto, JP), M. Grady (Philadelphia, USA), Y. Guillaneuf (Marseille, FR), S. Harriison (Toulouse, FR), A. M. van Herk (Singapore), J. P. A. Heuts (Eindhoven, NL), K. Hungenberg (Ludwigshafen, D), R. A. Hutchinson (Kingston, CAN), T. Junkers (Monash, AUS), A. Kajiwara (Nara, JP), B. Klumperman (Stellenbosch, ZA), I. Lacík (Bratislava, SK), P. Lacroix-Desmazes (Montpellier, FR), J. R. Leiza (San Sebastián, ES), P. Lovell (Manchester, UK), K. Matyjaszewski (Pittsburgh, USA), G. Moad (Melbourne, AUS), M. Monteiro (Brisbane, AUS), D. Moscatelli (Milan, IT), A. N. Nikitin (Moscow, RUS), S. Perrier (Sydney, AUS), G. T. Russell (Christchurch, NZ), E. Sato (Osaka City, JPN), D. A. Shipp (Clarkson, USA), J.-P. Vairon (Paris, FR), H. Vale (Ludwigshafen, D), P. Vana (Göttingen, D), J. Vorholz (Darmstadt, D), E. B. Wysong (Wilmington, USA), S. Yamago (Kyoto, JP), P. B. Zetterlund (Sydney, AUS), S. Zhu (Hamilton, CAN)

[total of 42 members from 16 countries]

Subcommittee Meetings (since 2018):

July 2nd 2018 at Macro2018 (Cairns), 20 attendees

July 6th 2019 at IUPAC General Assembly (Paris), 6 attendees

December 9th 2019 at PPC16, Pacific Polymer Conference (Singapore), cancelled due to sickness

Project completed since 2018 (with associated publications):

1. Critically Evaluated Propagation Rate Coefficients for Radical Polymerization: Vinyl Esters (Project 2013–045–1–400, R. A. Hutchinson)

This project was completed with the 2019 publication in Pure and Applied Chemistry. Two publications came out of the project:

"Critically evaluated rate coefficients in radical polymerization, 8. Propagation rate coefficients for vinyl acetate in bulk", C. Barner-Kowollik, S. Beuermann, M. Buback, R. A. Hutchinson, T. Junkers, H. Kattner, B. Manders, A. N. Nikitin, G. T. Russell, A. M. van Herk, *Macromol. Chem. Phys.* 218, 1600357 (2017)

"Critically evaluated propagation rate coefficients for radical polymerizations: acrylates and vinyl acetate in bulk (IUPAC Technical Report)", R. A. Hutchinson, S. Beuermann, *Pure Appl. Chem.* 91(11), 1883 (2019)

2. Critically Evaluated Rate Coefficients Associated with Initiation of Radical Polymerization (Project 2009–050–1–400, G. Moad)

This project was completed with the 2019 publication in Progress in Polymer Science:

“*A Critical Assessment of the Kinetics and Mechanism of Initiation of Radical Polymerization with Commercially Available Dialkyldiazene Initiators*”, G. Moad, *Prog. Polym. Sci.* 88, 130 (2019).

Ongoing projects:

3. Development of a Machine Accessible Kinetic Databank for Radical Polymerizations (Project 2019-045-1-400, T. Junkers)
4. Experimental methods and data evaluation procedures for the determination of radical copolymerization reactivity ratios (Project 2019-023-1-400, A. M. van Herk)
5. Critically evaluated rate coefficients for backbiting in acrylate radical polymerization (Project 2017-028-1-400, R. A. Hutchinson, T. Junkers)
6. Critically Evaluated Rate Coefficients for Radical Polymerizations of Styrene (Project 2013–047–1–400, leadership changed to K.-D. Hungenberg)
7. Critically Evaluated ESR (EPR) Spectra of Important Polymerization-Related Radicals (Project 2015–047–1–400, A. Kajiwara).
8. Critically Evaluated Rate Parameters for Chain-length-Dependent Termination Kinetics in Radical Polymerization of Styrene and Methyl Methacrylate (Project 2013–051–1–400, G. T. Russell)

Interdivisional project:

9. Guidance for the Compilation, Critical Evaluation and Dissemination of Chemical Data (Project 2018-009-2-500, D. Shaw) R. A. Hutchinson participates as representative from this Subcommittee

Appendix II

Recent activities of the Polymer Division Subcommittee of Structure and Properties of Commercial Polymers

Yongfeng Men

March 2020

Subcommittee of structure and properties of commercial polymers

1. There were TWO EA meetings of subcommittee of structure and properties of commercial polymers during 2018-2019 and one preparatory meeting before 2019 EA meeting.
 - No. 76A, Busan (Korea), November 2-3, 2018. Participants: 21 participants from 3 countries
 - No. 77A, Ishigaki-island, Okinawa (Japan), November 14-15, 2019. Participants: 23 participants from 3 countries
 - Preparatory meeting, Beijing (China), September 4th, 2019. Participants: 9 participants from China.
2. Membership:
 - Approve of three new members: China: Prof. Xiangling Ji, Changchun Institute of Applied Chemistry, xlji@ciac.ac.cn; Korea: Prof. DongGi Seong, Pusan National University, dgseong@pusan.ac.kr; Dr. Myun-Han Yoon, Gwangju Institute of Science and Technology, mhyoon@gist.ac.kr.
 - Approve of two observes: China: Prof. Aihua He, Qingdao University of Science and Technology, ahhe@qust.edu.cn; Prof. Xia Dong, Institute of Chemistry, Chinese Academy of Sciences, xiadong@iccas.ac.cn.
 - Approve of six retire persons: Korea: Dr. Bongkeun Lee, LG Chemical Co., Ltd., bkleee@lgchem.com; Dr. YoungKeun Lee, SK Energy, lyk@skcorp.com; Prof. Jun Young Lee, Sungkyunkwan University, Korea, Email: jylee7@skku.edu. China: Prof. Jingshen Wu, Southern University of Science and Technology, wujingshen@sutstech.edu.cn; Prof. Qing Yan, Haier National Eng. Res. Center of Plastic Ltd., qyan@nimte.ac.cn; Prof. Xiaoqing Wang, Beijing Institute of Technology, wangxq@bit.edu.cn.
3. Build a scientific exchange platform through academic reports.
 - Prof. Doo Sung Lee, (Sungkyunkwan University, Korea), “The history of our subcommittee” (20 minutes)
 - Prof. Jinliang Qiao, (China Petroleum and Chemical Corporation, China), “G-resin Project Summary Report, Project name: A Transparent PP with very low soluble fraction (#2016-028-1-400)” (20 minutes)
 - Prof. Aihua He, (Qingdao University of Science and Technology, China), “Synthesis structure and properties of PP/PB alloys” (20 minutes)
 - Prof. Xiangling Ji (Changchun Institute of Applied Chemistry, China), “Fractionation of G resins and their chain microstructure” (20 minutes)
 - Prof. Yongfeng Men (Changchun Institute of Applied Chemistry, China), “Large strain stress whitening in G-resin.” (20 minutes)
 - Prof. Peng Chen, (Ningbo Institute of Material Technology and Engineering), “Preparation and properties of PLA/POK blend fibers” (20 minutes)

- Dr. Mijeong Han (Korea Research Institute of Chemical Technology, Korea)
"Enhancement of electrochemical performances of cathodes and anodes in lithium ion batteries by functional polymeric binders" (20 minutes)
4. Three New Feasibility Studies of Structure and Properties of Commercial Polymers
- SINOPEC Commercial Polymers; Anti-bacterial and anti mildew PP resin
 - Hyosung Commercial Polymer; Polyketone – New Green Polymeric Material
 - Prof. Peng Chen proposed a project of “structure and properties of PLA”.

Appendix III

Recent activities of the Polymer Division Subcommittee of Polymer Terminology

Roger Hiorns and Paul Topham

July 2019

1. The following projects delivered the following publications or have been accepted for publication:

2001-081-1-800: (DENDRITIC) Terminology and structure-based nomenclature of dendritic and hyperbranched polymers* – Fradet: published as, ‘Terminology and structure-based nomenclature of dendritic and hyperbranched polymers (IUPAC Recommendations 2017)’, A. Fradet, J. Chen, K.-H. Hellwich, K. Horie, J. Kahovec, W. Mormann, R. F. T. Stepto, J. Vohlídal, E. S. Wilks, *Pure & Appl. Chem.*, 91(3), 523-561. <https://doi.org/10.1515/pac-2016-1217>

2010-036-1-400: (KEYWORDS) *Keywords in polymer science journals* – Slomkowski: published as, ‘List of keywords for polymer science (IUPAC Technical Report)’, S. Slomkowski*, C. M. Fellows, R. C. Hiorns, R. G. Jones, Prze Kubisa, C. K. Luscombe, T. Nakano, G. T. Russell, C. G. dos Santos, C. Scholz, N. Stingelin, M. G. Walter, *Pure & Appl. Chem.*, 2019; 91(6):997-1027. <https://doi.org/10.1515/pac-2018-0917>

2008-020-1-400: (WEB-GUIDE) *Revision of the web-based guide, IUPAC Recommendations on Macromolecular Nomenclature—Guide for Authors of Papers and Reports in Polymer Science and Technology* – accepted for publication.

2. The following projects are currently in public review:

2014-033-1-400: (LACTIC) *Nomenclature and terminology relevant to lactic acid-based polymers: synthesis, structure, properties, applications and degradation* – Vert

2009-047-1-400: (STEREOCHEM) *Definitions and notations relating to stereochemical aspects in polymer science* – Hellwich & Moad

2012-001-1-400: (NANO-LITHO) *Terminology of nanomaterials and nanotechnology in polymer science*, Ober & Jones through the document, *Terminology of Polymers in Advanced Lithography*

3. The following projects are expected to be sent to public review in the next few months:

2013-031-3-800: (STAR) *Structure-based nomenclature for regular linear star, comb and brush polymers** - Chen

4. The following projects are working:

2012-048-3-400: (B-TERMS) *A brief guide to polymer terminology* – Hiorns & Vohlídal

2006-028-1-400: (FIELD) *Terminology for conducting, electro-active and field-responsive polymers* – Vohlídal

2010-007-1-400: (CHAIN) *Terminology for chain polymerization* – Luscombe & Moad

2011-035-1-800: (TINCOPS) *Terminology and nomenclature of inorganic and coordination polymers – a extended revision of Nomenclature for regular single-strand and quasi-single-strand inorganic and coordination polymers (1984)** - Jones

2014-034-2-400 (CAR) *Nomenclature for polymeric carriers bearing chemical entities*

2014-014-1-400 (MODSIM) *Terminology for Modeling and Simulation of Polymers* - Meille

2015-013-1-400 (POLY) *Brief Guide to Polymerization Terminology* – Luscombe

2015-014-1-400 (SEMIS) *Guide (and Brief Guide) to Polymer Semiconductors* – Walter

2015-032-2-400 (WIKI) *Synchronizing Wikipedia: Polymer Definitions and Terminology* – Hess

2015-049-1-400 (CHAR) *Brief Guide to the Characterisation of Polymers* – Topham
2015-050-1-400 (ULTIMATE) *Definition of Terms Relating to the Ultimate Mechanical Properties of Polymers* – Adhikari
2016-050-3-400: (μ STRUCTURE) *Definition of Terms Pertaining to Polymers in the Solid State: Molecular Arrangement from the Nano- to the Micrometer Scale* - Stingelin
2017-039-2-800: (GRAPHIC) *Graphical Representation of Polymer Structures* – Hellwich

5. The following projects have recently been accorded funding or extension or both:

2018-033-1-400 (ADDIPLAST) Additives intended to promote the degradation of polyolefin-based thermoplastic materials – Malinconico
2019-014-2-400 (Aggregates) Associates and aggregates of polymers - Nakano

6. Projects submitted or close to submission to IUPAC for funding:

2019-XXX-X-400 (OVER) Basic classification and definitions of polymerization reactions - Matson
2019-XXX-X-400 (SEQs) Sequence-control polymers - Théato
2019-XXX-X-800 (ELECTRO) Electronic Formulae – Yerin
2019-XXX-X-400 (Nano) Yoon & Jones
2020-XXX-X-800 (Stars2) Structure-based nomenclature for irregular linear, star, comb and brush polymers with different types of constitutional repeating units - Chen
2020-XXX-X-400 (DE) Degradation of polymers – Gardette
2020-XXX-X-800 Revision of the Brief Guide to Polymer Nomenclature - Hiorns