NOVEL TRENDS IN RHEOLOGY IX
PROGRAMME REPORT

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This is to memorialize the wonderful meeting organized and led by Martin Zatloukal of Tomas Bata University in Zlin. Each of the prior eight meetings has represented a significant step forward in rheology and rheometry, and this ninth meeting, following a 4-year sabbatical, was no exception.

Chris Macosko opened the meeting and the session on extensional rheometry with a penetrating lecture on the state of the art [1]. Macosko also announced the developing second edition of his textbook, with Ewoldt and McKinley, now about a year out. Martin Zatloukal followed with his own group's research on capillary entrance pressure, its explanation, and its use in extensional rheometry.

Onur Özgul, Ansgar Frendel, and Loredana Völker-Pop on the latest in commercially available rheometry from Netzsch, Thermo Fisher Scientific (Pragolab) and Anton Paar, respectively, whose companies generously sponsored the meeting [2].

Helmut Münstedt treated the participants to a concise and comprehensive treatment of extensional polymer strain-hardening with special focus on the related roles of Rouse times [3]. Münstedt also treated the curious extensional strain-hardening behaviors of polypropylene alloyed with a trace of ultrahigh molecular weight polyethylene. Paula Marie Wood-Adams gifted her audience with her perspective and advances on slip and surface fractionation of polymer melts [4]. Wood-Adams and her group have uncovered a relations between surface fractionation and slip, and also between this fractionation and melt rupture.

Savvas Hatzikiriakos artfully deepened our understanding of the remarkable phenomena of self-healing in aminated polyolefins [5]. Jeffrey Giacomin reported the recent advances in polymer viscoelasticity from general rigid bead-rod theory, which he

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[1] Macosko, C.W. "Extensional rheometry via flow through an abrupt contraction: A short review" *AIP Conference Proceedings*, 2997, art. no. 020001 (2023).

[2] Zatloukal, M. and Musil, J. "Sponsors: Novel Trends in Rheology IX" *AIP Conference Proceedings*, 2997, art. no. 010002 (2023).

[3] Münstedt, H. "Strain hardening of various polymer melts" *AIP Conference Proceedings*, 2997, art. no. 020002 (2023).

[4] Sattari, M., Kwakye-Nimo, S., Inn, Y.W., Wood-Adams, P.M. "Shear flow of bimodal polyethylene: Slip and surface fractionation" *AIP Conference Proceedings*, 2997, art. no. 020006 (2023).

[5] Yavitt, B.M., Tomkovic, T., Gilmour, D.J., Zhang, Z., Kuanr, N., Ruymbeke, E.V., Schafer, L.L., Hatzikiriakos, S.G. "Self-healing behavior of aminated polyolefins with dynamic associations" *AIP Conference Proceedings*, 2997, art. no. 040001 (2023).

and his colllaborators Mona Kanso and Myong Chol Pak have coined *rotarance* theory. This included newly derived material functions in shear (large-amplitude oscillatory, steady shear) and in steady extension (uniaxial, biaxial, planar) from rotarance theory, and its bridge to the Oldroyd framework. The *Restaurace Na Pinduli* then received the conferees and delighted them with an evening featuring the unforgettable plum-stuffed pork roll.

Valerian Hirschberg opened the second day entertaining with a comprehensive lecture on the rheology of polystyrene pom-poms and combs [6]. Manfred Wagner delivered expertly his lecture on elongation and fracture of long-chain branched polymer melts.

Of the twelve posters presented, best poster was awarded to Jiri Drabek, for his research on pre-shear and flow-induced polymer crystallization carried out in collaboration with and while visiting Professor Yamaguchi in Japan [7].

Manfred Wilhelm offered the conferees to a comprehensive treatment of combined methods in rheology for correlating length and time scales. Masayuki Yamaguchi treated his audience to his intriguing modification of nonisothermal extensional rheology [8].

João Miguel Nóbrega intrigued the community with the state of the art in computational laser sintering [9]. Roland Kádár completed the programme by exploring the challenges scientists and engineers face in the assembly of hierarchical materials [10].

The meeting attracted 15 invited lecturers and total of 51 participants from 9 countries (Japan, United States, Canada, Portugal, Greece, Sweden, Germany, Austria, Czech Republic) spanning 3 continents. The meeting, and its proceedings [11], catalyzed a significant step forward in the rheology and rheometry of polyolefins.

The next meeting of this series (Novel Trends in Rheology X) will be organized in July 30-31, 2025 (https://noveltrends10.ft.utb.cz/home.html) and specific attention will be paid to applied rheology and polymer processing.

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[6] Hirschberg, V., Schußmann, M.G., Röpert, M.-C. "Shear and elongational rheology of model polystyrene pom-poms" *AIP Conference Proceedings*, 2997, art. no. 020003 (2023).

[7] Drabek, J., Janchai, K., Kida, T., Yamaguchi, M., Zatloukal, M. "Effect of pre-shear on flow-induced crystallization of branched polypropylene" *AIP Conference Proceedings*, 2997, art. no. 020005 (2023).

[8] Yamaguchi, M., Seemork, J., Phulkerd, P., Ali, M.A.B.M. "Modification of rheological responses under elongational flow at non-isothermal condition" *AIP Conference Proceedings*, 2997, art. no. 020004 (2023).

[9] Castro, J., Nóbrega, J.M., Costa, R. "Computational modelling of the selective laser sintering process" *AIP Conference Proceedings*, 2997, art. no. 050001 (2023).

[10] Kádár, R., Terry, A., Nygård, K., Nypelö, T., Westman, G., Wojno, S., Ghanbari, R., Fazilati, M., Bek, M., Sonker, A.K. "Challenges in nano-structured fluid flows for assembly into hierarchical biomaterials" *AIP Conference Proceedings*, 2997, art. no. 020007 (2023).

[11] Zatloukal, M. "Preface: Novel Trends in Rheology IX" *AIP Conference Proceedings*, 2997, art. no. 010001 (2023).

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Figure 1 Conference book.

Figure 2 Christopher W. Macosko (left) receiving the certificate from Helmut Münstedt (right) for lecture "Extensional Rheometry via Flow through an Abrupt Contraction: a Short Review".

Figure 3 Helmut Münstedt (right) receiving the certificate from Savvas George Hatzikiriakos (left) for lecture "Strain Hardening of Various Polymer Melts".

Figure 4 Paula Marie Wood-Adams (right) receiving the certificate from Savvas George Hatzikiriakos (left) for lecture "Shear Flow of Bimodal Polyethylene: Slip and Surface Fractionation".

Figure 5 Savvas George Hatzikiriakos (right) receiving the certificate from Roland Kádár (left) for lecture "Self-healing Behavior of Aminated Polyolefins with Dynamic Associations".

Figure 6 Alan Jeffrey Giacomin (right) receiving the certificate from Roland Kádár (left) for lecture "Recent Advances in Polymer Viscoelasticity from General Rigid Bead-rod Theory".

Figure 7 Valerian Hirschberg (left) receiving the certificate from Alan Jeffrey Giacomin (right) for lecture "Shear and Elongational Rheology of Model Polystyrene Pom-Poms".

Figure 8 Manfred Hermann Wagner (left) receiving the certificate from Alan Jeffrey Giacomin (right) for lecture "Modeling Elongational Flow and Fracture of Long-chain Branched Polymer Melts".

Figure 9 Manfred Wilhelm (right) receiving the certificate from Christopher W. Macosko (left) for lecture "Novel Combined Methods in Rheology: Rheo-NMR, Rheo-IR and Rheo-Dielectric to Correlate Length and Time Scales".

Figure 10 Masayuki Yamaguchi (left) receiving the certificate from Christopher W. Macosko (right) for lecture "Modification of Rheological Responses under Elongational Flow at Non-Isothermal Condition".

Figure 11 João Miguel Nóbrega (left) receiving the certificate from Manfred Hermann Wagner (right) for lecture "Computational Modelling of the Selective Laser Sintering Process".

Figure 12 Roland Kádár (left) receiving the certificate from Manfred Hermann Wagner (right) for lecture "Challenges in Nano-Structured Fluid Flows for Assembly into Hierarchical Biomaterials".

Figure 13 Jiri Drabek (left) receiving the Best poster award from Alan Jeffrey Giacomin (right) for his poster "Effect of Pre-Shear on Flow-Induced Crystallization of Branched Polypropylene".

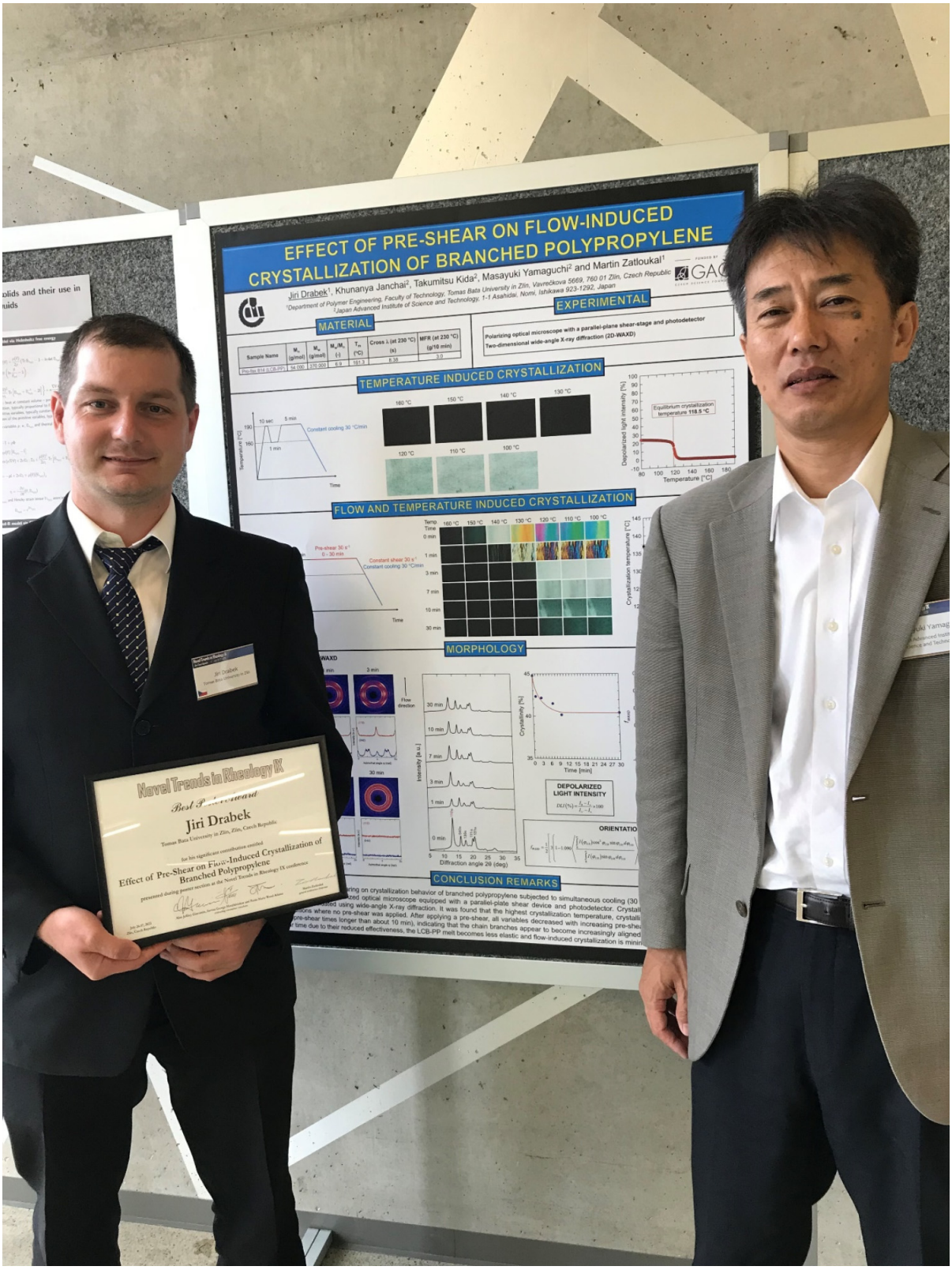

Figure 14 The winner of the competition for the best poster Jiří Drábek (left) for the work entitled "Effect of Pre-Shear on Flow-Induced Crystallization of Branched Polypropylene", which he carried out as part of a one-month internship at the Japan Advanced Institute of Science and Technology in 2022 under the supervision of Prof. Yamaguchi (right).

Figure 15 Dinner.

Figure 16 Poster section.

Figure 17 Exhibition.

Figure 18 Conference room.

Figure 19 Refreshment.