

NOVEL TRENDS IN RHEOLOGY V

Zlin, Czech Republic 30 – 31 July 2013

EDITOR

Martin Zatloukal

Tomas Bata University in Zlin, Zlin, Czech Republic

All papers have been peer reviewed.

SPONSORING ORGANIZATIONS

Anton Paar
Nexans
Thermo Scientific
Pragolab

AIP|Publishing

Melville, New York, 2013

AIP I CONFERENCE PROCEEDINGS ■ 1526

Editor

Martin Zatloukal
Polymer Centre, Faculty of Technology
Tomas Bata University in Zlin
Nam. T. G. Masaryka 275
762 72 Zlin
Czech Republic

and

Centre of Polymer Systems, University Institute
Tomas Bata University in Zlin
Nad Ovcirnou 3685
760 01 Zlin
Czech Republic

Email: mzatloukal@ft.utb.cz

Authorization to photocopy items for internal or personal use, beyond the free copying permitted under the 1978 U.S. Copyright Law (see statement below), is granted by AIP Publishing LLC for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$30.00 per copy is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923, USA: <http://www.copyright.com>. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Services is: 978-0-7354-1151-7/13/\$30.00.

© 2013 AIP Publishing LLC

No claim is made to original U.S. Government works.

Permission is granted to quote from the AIP Conference Proceedings with the customary acknowledgment of the source. Republication of an article or portions thereof (e.g., extensive excerpts, figures, tables, etc.) in original form or in translation, as well as other types of reuse (e.g., in course packs) require formal permission from AIP Publishing and may be subject to fees. As a courtesy, the author of the original proceedings article should be informed of any request for republication/reuse. Permission may be obtained online using RightsLink. Locate the article online at <http://proceedings.aip.org>, then simply click on the RightsLink icon/"Permissions/Reprints" link found in the article abstract. You may also address requests to: AIP Publishing Office of Rights and Permissions, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502, USA; Fax: 516-576-2450; Tel.: 516-576-2268; E-mail: rights@aip.org.

ISBN 978-0-7354-1151-7
ISSN 0094-243X
Printed in the United States of America

AIP Conference Proceedings, Volume 1526
Novel Trends in Rheology V

Table of Contents

Foreword: Novel Trends in Rheology V Martin Zatloukal	1
NON-NEWTONIAN FLUID MECHANICS	
Wall slip of linear polymers (HDPEs) Mahmoud Ansari and Savvas G. Hatzikiriakos	3
Historical review of die drool phenomenon during plastics extrusion Jan Musil and Martin Zatloukal	16
Die drool and die drool theory A. M. Schmalzer and A. Jeffrey Giacomini	35
Characterization of die drool sample produced by HDPE melt extrusion Jan Musil and Martin Zatloukal	47
Effect of polymer melt wall slip on the flow balance of profile extrusion dies Olga S. Carneiro, Luís L. Ferrás, Fernando T. Pinho, and João M. Nóbrega	59
On the performance of a 2D unstructured computational rheology code on a GPU Simão P. Pereira, Kees Vuik, Fernando T. Pinho, and João M. Nóbrega	72
Influence of the power law index on the fiber breakage during injection molding by numerical simulations Frederik Desplentere, Wim Six, Hilde Bonte, and Eric Debrabandere	90
Investigation of heat transfer in 9-layer film blowing process by using variational principles Roman Kolarik and Martin Zatloukal	107

Evaluation of variational principle based model for LDPE large scale film blowing process	
Roman Kolarik and Martin Zatloukal	119
Numerical simulation of extrusion: A good tool for troubleshooting extrusion problems	
Birane Touré, Jiri Svabik, Michael Veaux, Walid Bahloul, Jean-Pierre Mascia, Mikael Abéguilé, Thierry Seux, and Stig-Jrale Hauko	128
Effect of rheological parameters on curing rate during NBR injection molding	
Kamil Kyas, Michal Stanek, David Manas, and Adam Skrobak	142
NOVEL RHEOLOGICAL TECHNIQUES	
Elongational experiments on polymer melts and their assessment	
Helmut Münstedt	148
On the viscosity maximum during uniaxial extension: Material property or measuring artifact?	
Zdeněk Starý, Teodor Burghelea, and Helmut Münstedt	160
Elongational flow of polymer melts at constant strain rate, constant stress and constant force	
Manfred H. Wagner and Víctor H. Rolón-Garrido	168
Evaluation of temperature-strain rate dependent uniaxial and planar elongational viscosities for branched LDPE polymer melt	
Martin Zatloukal	184
Photo-oxidation of LDPE: Effects on elongational viscosity	
Víctor H. Rolón-Garrido and Manfred H. Wagner	194
On the (ir)reproducibility of measurements of elongational viscosity using an SER universal testing platform	
Petr Filip and Radek Pivokonsky	209
RHEOLOGY OF POLYMERS, COMPOSITES, BLENDS AND GELS	
Rheological characterization of degradation and polycondensation of poly(ethylene terephthalate) melt in air and in nitrogen	
Matthias Kruse, Víctor H. Rolón-Garrido, and Manfred H. Wagner	216

Investigation of crosslinking behaviour of silane grafted polyethylene through rheology Ales Obr and Martin Zatloukal	230
Rheological evaluation of melt blown polymer melt Jiri Drabek and Martin Zatloukal	237
Rheology as a tool to follow hybrid nanocomposites preparation Manuel Oliveira and Ana Vera Machado	248
Shear induced electrical behaviour of conductive polymer composites Zdeněk Starý, Johannes Krüchel, and Dirk W. Schubert	258
Deformation theory of an electro-conductive composite composed of entangled network of carbon nanotubes embedded in elastic polyurethane Petr Slobodian, Pavel Riha, Robert Olejnik, and Petr Saha	268
Description of the flow induced coalescence in immiscible polymer blends – Advances and persisting problems Ivan Fortelný and Josef Jůza	278
Morphology, absorptivity and viscoelastic properties of mineralized PVP-CMC hydrogel Nabanita Saha, Rushita Shah, Radek Vyroubal, Takeshi Kitano, and Petr Saha	292
Effect of strain on viscoelastic behavior of fresh, swelled and mineralized PVP-CMC hydrogel Nabanita Saha, Radek Vyroubal, Rushita Shah, Takeshi Kitano, and Petr Saha	301
APPLIED RHEOLOGY FOR POLYMER NANOFIBER PRODUCTION AND CHARACTERIZATION	
Quality of nanofibrous web in dependence on the preparation of polymer solutions Petra Peer and Petr Filip	310
The effect of nanofiber based filter morphology on bacteria deactivation during water filtration Dusan Kimmer, Ivo Vincent, Jaroslav Lev, Libor Kalhotka, Premysl Mikula, Radka Korinkova, Wannes Sambaer, and Martin Zatloukal	316

Effect of particle-fiber friction coefficient on ultrafine aerosol particles clogging in nanofiber based filter	
Wannes Sambaer, Martin Zatloukal, and Dusan Kimmer	326
Author Index	339