Polymer Bulletin (2024) 81:5653–5655
https://doi.org/10.1007/s00289-023-04988-y

EDITORIAL

Topical section "Advanced Testing of Soft Polymer Materials"

Radek Stoček[1,2] · Eric Euchler[3]

Published online: 29 September 2023

The topical section "Advanced Testing of Soft Polymer Materials" focuses on high-value manuscripts related to sophisticated characterization methods of soft polymer materials. Due to the increasing demands in the application of advanced technology not only in everyday life but especially in industrial applications and the increasing demands for reduction of the environmental footprint, it is necessary to replace conventional materials by soft polymers with enhanced properties and capabilities. In fact, manufacturers of soft polymer products as well as suppliers and processors of polymers, raw materials and blends or compounds are forced to apply predictive and advanced laboratory testing in the search for high-performance applications, e.g. for e-mobility (durable tires), energy generation (flexible solar or photovoltaic cells), information technology (versatile semiconductors and sensing technology), soft robotics and medical engineering (artificial tissues), or food and cosmetics industry (environmentally friendly packaging). Ideally, predictive laboratory testing balances accuracy, relevance, instrument productivity and cost-effectiveness, while providing new mechanistic insights and opportunities for modeling the overall properties of materials and products. In this context, new concepts for soft polymeric materials are of great importance, taking into account new trends in nanotechnology, multi-layered and self-assembled materials, self-healing, sensor-active or functionalized polymers, biocompatibility, eco-design and recyclability. New advanced testing methods and techniques will establish links with fundamental scientific principles, even showing how test results of single pieces of uncured/cured elastomers and silicones, thermoplastic elastomer blends, (hydro-)gels or other soft polymers relate to real geometry and loading conditions, creating new opportunities to link laboratory test data to the performance of real products. Furthermore, the rapid development

✉ Eric Euchler
euchler-eric@ipfdd.de

[1] PRL Polymer Research Lab., S.R.O., Nad Ovčírnou 3685, 760 01 Zlín, Czech Republic

[2] Centre of Polymer Systems, University Institute, Tomas Bata University, tř. Tomáše Bati 5678, 760 01 Zlín, Czech Republic

[3] Research Division Elastomers, Institute of Polymer Materials, Leibniz-Institut für Polymerforschung Dresden, Hohe Straße 6, 01069 Dresden, Germany

of simulation tools offers great prospects for predicting the behavior of soft polymer materials and their durability based on unique data sets obtained through new advanced testing methods, including the upcoming possibilities of artificial intelligence. The scope of the manuscripts includes but is not limited to, (i) the development and application of newly developed or unique advanced testing methods for soft polymer materials for chemical, rheological, mechanical, thermal, electrical and magnetic analysis, as well as (ii) concepts for predictive testing and realistic load simulation where comprehensive information on materials and product behavior will be gathered at an early stage. More specifically, the required topics on advanced testing methods and equipment should illustrate advances in areas such as mechanical multi-axis testing, dynamic-mechanical and thermal analysis, dielectric testing, NMR or FTIR spectroscopy, advanced optical and radiation methods, morphological and structural analysis, fracture and fatigue analysis, wear prediction, analysis of solid particulate emulsions of polymeric materials into various environmental compartments, friction testing, and numerical and physical modeling of soft polymer material properties. Thus, the scope of the journal offers a publication platform to meet current and substantial demand.

Journal keywords

- Elastomers and rubbers
- Soft polymers
- Testing equipment
- Testing methodologies
- Development of methods
- Advanced testing
- Fatigue and fracture
- Friction and interactions
- Wear
- Aging and degradation
- Particle emission
- Mechanical testing
- Dynamic-Mechanical Testing
- Thermo-dynamical / Caloric Testing
- Dielectric Testing
- NMR, FTIR or other spectroscopy
- X-ray and neutron scattering
- Numerical and Physical Modelling

Funding Open Access funding enabled and organized by Projekt DEAL.