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Rheology of 3D Printing

Guest Editor:

Prof. Dr. Antxon Santamaria
POLYMAT and Polymer Science and Technology Department, Faculty of Chemistry, University of the Basque Country UPV/EHU, 20018 San Sebastian, Spain

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Message from the Guest Editor

3D printing is gaining ground because it allows the construction of customized objects with high geometric complexity. Polymer melts are mostly used in 3D printing, leading to significant reductions in both time and manufacturing costs. The implications of rheology in 3D printing are even more relevant than in well-known and investigated injection moulding and extrusion moulding methods.

A basic requirement of 3D printing is matching the extrusion velocity at the exit of the nozzle with the printing velocity. This is related to the viscosity and elasticity of the polymer melt, which in turn depend on the molecular parameters, temperature, and the geometry of the nozzle. The viscoelastic behavior of the melt during cooling when deposited on the bed is also crucial because welding between layers, which determines the mechanical performance of the printed object, is closely related to viscoelasticity.

Studies on shear/elongational viscosity and extrudate swell, under conditions similar to those of 3D printing, and investigations on viscoelasticity and its correlation with interlayer adhesion (theoretical and experimental works), are welcome in this Special Issue.

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Editor-in-Chief

Prof. Dr. Alexander Böker
Lehrstuhl für Polymermaterialien und Polymertechnologie, University of Potsdam, 14476 Potsdam-Golm, Germany

Message from the Editor-in-Chief

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Contact Us

Polymers Editorial Office
MDPI, St. Alban-Anlage 66
4052 Basel, Switzerland

Tel: +41 61 683 77 34
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