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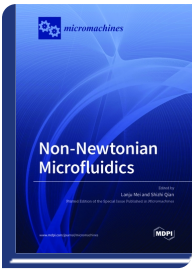
Special Issue Reprint

Non-Newtonian Microfluidics



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Microfluidics has seen a remarkable growth over recent decades, with its extensive applications in engineering, medicine, biology, chemistry, etc. Many of these real applications of microfluidics involve the handling of complex fluids, such as whole blood, protein solutions, and polymeric solutions, which exhibit non-Newtonian characteristics—specifically viscoelasticity. The elasticity of the non-Newtonian fluids induces intriguing phenomena, such as elastic instability and turbulence, even at extremely low Reynolds numbers. This is the consequence of the nonlinear nature of the rheological constitutive equations. The nonlinear characteristic of non-Newtonian fluids can dramatically change the flow dynamics, and is useful to enhance mixing at the microscale. Electrokinetics in the context of non-Newtonian fluids are also of significant importance, with their potential applications in micromixing enhancement and bio-particles manipulation and separation. In this Special Issue, we welcomed research papers, and review articles related to the applications, fundamentals, design, and the underlying mechanisms of non-Newtonian microfluidics, including discussions, analytical papers, and numerical and/or experimental analyses.

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