Special Issue

Machine Learning in Microfluidics

Message from the Guest Editor

Microfluidics has revolutionized the way we manipulate and analyze fluids at the microscale, enabling a broad range of applications in diagnostics, synthetic biology, materials science, and beyond. However, the complexity of fluid dynamics, device design, and experimental variability presents significant challenges. Recent advances in machine learning (ML) offer powerful tools to address these issues, facilitating the intelligent design, control, and optimization of microfluidic systems. This Special Issue aims to highlight the synergistic integration of machine learning techniques with microfluidic technologies. Topics of interest include, but are not limited to, ML-assisted device design, flow control, droplet and particle tracking, image-based analysis, anomaly detection, and the automation of experimental workflows. We also welcome contributions focusing on data-driven modeling, surrogate simulations, and physics-informed ML approaches tailored to microfluidic environments.

Guest Editor

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