Special Issue

Microfluidic High-Throughput Single-Cell Analysis

Message from the Guest Editor

Cellular heterogeneity is a hallmark of multicellular life, giving forms and functions to organisms by facilitating specialization. With such ubiquity, it is of no wonder that this heterogeneity controls the physiology and pathogenesis of many diseases. Despite the known cellular heterogeneity, it is still common to use population-scale bulk analysis, masking the subsets of cells critical for biological discoveries and clinical decisions. As compared to bulk analysis, single-cell analysis, which analyzes the properties of individual cells, is the key to deciphering heterogeneous attributes in cell populations. Microfluidic technology has emerged as a state-of-the-art approach for single-cell analysis because of its precise micro-environment manipulation, minimal reagent usage, and high potential in scaling and automation. Its capability to control fluids in the range of nanoliters to picoliters can not only precisely isolate individual cells inside each chamber at single-cell resolution but also achieve high sensitivity of chemical sensing from a small amount of cellular contents.

Guest Editor

Dr. Yu-Chih Chen

- 1. UPMC Hillman Cancer Center, University of Pittsburgh, Pittsburgh, PA 15260, USA
- 2. Department of Computational and Systems Biology, University of Pittsburgh, Pittsburgh, PA 15260, USA
- 3. CMU-Pitt Ph.D. Program in Computational Biology, Pittsburgh, PA 15260, USA
- 4. Department of Bioengineering, Swanson School of Engineering, University of Pittsburgh, Ptttsburgh, PA 15260, USA

Deadline for manuscript submissions

closed (31 October 2021)



Micromachines

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mdpi.com/si/63638

Micromachines
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
micromachines@mdpi.com

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Impact Factor 3.0 CiteScore 6.0 Indexed in PubMed



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Editor-in-Chief

Prof. Dr. Ai-Qun Liu

- 1. Department of Electrical and Electronic Engineering, The Hong Kong Polytechnic University, Hong Kong, China
- 2. School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore 639798, Singapore

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