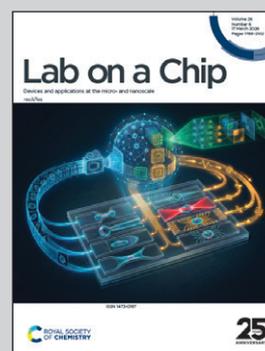


Showcasing research from Professor Gang Li's laboratory, College of Optoelectronic Engineering, Chongqing University, Chongqing, China.

Systematic characterization and mechanistic insights into ultrasonically actuated sharp-tip capillary droplet generation

A systematic characterization of an ultrasonically actuated sharp-tip capillary droplet generator is presented, establishing the foundation for rationally designing a chip- and pump-free “droplet factory”. Parameter mapping across excitation voltage, AM waveform timing, tip diameter, and fluid viscosities yields practical design rules and elucidates a three-stage mechanism: centrifugal pumping, streaming-assisted neck elongation, and Laplace-pressure-driven pinch-off upon vibration cessation. Pulse-width programming produces deterministic picoliter-to-nanoliter droplet trains with multiple predefined volumes for reliable synthesis of highly monodisperse hydrogel microspheres. This platform offers a versatile tool for materials synthesis and clinical applications.

As featured in:



See Gang Li *et al.*,
Lab Chip, 2026, **26**, 1930.