

## **Computations of Compound Droplet Formation in a Flow Focusing Device**

**\*S. Homma**

Division of Materials Science, Graduate School of Science and Engineering, Saitama University,  
255 Shimo-Okubo, Sakura-ku, Saitama 338-8570, Japan.

\*Corresponding author: honma@apc.saitama-u.ac.jp

The formation of compound droplets in a flow focusing device is simulated numerically by a three-fluid front-tracking method. The geometry of the device and the flow rates of core, shell, and external fluids are changed to examine the effects of those on the formation of compound droplets. The several modes of the formation were observed: simple droplets (no core droplets), regular compound droplets, and multiple-core droplets. They are mapped on the diagrams of the combinations of several non-dimensional numbers. The geometry of the orifice to focus the flow located ahead of the dual nozzle for the core and shell fluids, affected the mode and the size of the compound droplets. It was observed that the size of the compound droplets abruptly increased as the flow rate of the external fluid was increased. It suggests that the mode changes suddenly due to the balance of the flow rates among core, shell, and external fluids.

**Keywords:** Compound droplets, Front-tracking, Flow focusing device