Droplet based microfluidic device for multiple droplet array

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We present a highly versatile and programmable droplet based multiple droplet array system that include droplet generation, array, storage, fusion, and elimination process. By integrating pneumatic microvalves with microfluidic system, we can achieve to precisely manipulate individual droplets for delivering, merging and mixing of distinct droplets. This method readily allow us to achieve in-situ monitoring and screening of several types of chemical and biochemical reactions. Thus, we expect that the proposed platform will be a powerful tool to study fundamental biological and chemical reactions, high throughput screening (HTS), or combinatorial synthesis or analysis.