

## **Microchannel Emulsification by a Microspace System**

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### **Summary**

Microchannel (MC) arrays with various shapes and sizes were micro-fabricated using a single-crystal silicon substrate. An emulsion is prepared by simply forcing dispersed phase fluid into continuous phase fluid through the MC. The grooved type MC and module were used to characterize MC emulsification, and straight-through MC and module were developed for higher productivity. Monodisperse emulsions with average droplet sizes ranging from 5-90  $\mu\text{m}$  and coefficients of variations lower than 10% have been successfully obtained. Emulsification was significantly affected by MC sizes and structures. Analysis by high-speed camera revealed that the structure of the terrace is important for instability at the outlet, and spontaneous droplet formation through MC was highly applicable to emulsification. MC emulsification was also applied to production of solid-lipid and polymeric microspheres, and microcapsules, showing high availability. The MC emulsification technology has great potential for food, pharmaceutical and chemical industries.