Vapor Propelled Marangoni Effect

Schuhmann, William

The Marangoni effect describes the transfer of mass down a surface tension gradient along the interface of two fluids. While this effect has been utilized for millennia by spiders and microvelia for propulsion in water, its potential uses in engineering have only recently been explored. Here, we investigate the Gibbs-Marangoni effect's applicability to micro-vessel propulsion, where we hypothesize that surface-gradient propulsion holds scaling advantages compared to more conventional methods of propulsion. We present results on optimized Marangoni propulsion systems and discuss real-world applications such as high-efficiency autonomous vehicles and surfactant-propelled micro-vessels for cleaning oil spills.

Awards Won: