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Effect of internal flow and evaporation on hydrogel assembly process at droplet interface.[1] GIHO KANG, BAEKHOON SEONG, YEONGHYEON GIM, HAN SEO KO, DOYOUNG BYUN, Sungkyunkwan University — Recently, controlling the behavior of nanoparticles inside liquid droplet has been widely studied. There have been many reports about the mechanism of the nanoparticles assembly and fabrication of a thin film on a substrate. However, the assembly mechanism at a liquid-air interface has not been clearly understood to form polymer chains into films. Herein, we investigated the role of internal flow on the thin film assembly process at the interface of the hydrogel droplet. The internal fluid flow during the formation of the hydrogel film was visualized systematically using micro-PIV (Particle image velocimetry) technique at various temperatures. We show that the buoyancy effect and convection flow induced by heat can affect the film morphology and its mechanical characteristics. Due to the accelerated fluid flow inside the droplet and evaporation flux, densely assembled hydrogel film was able to be formed. Film strength was increased 24% with temperature increase from 40 to 80 degrees Celsius. We expect our investigations could be applied to many applications such as self-assembly of planar structures at the interface in coating and printing process.

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