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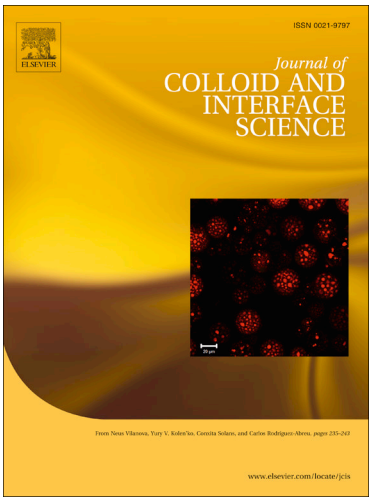

Deposition pattern and tracer particle motion of evaporating multi-component sessile droplets

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Deposition pattern and tracer particle motion of evaporating multi-component sessile droplets

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Abstract: The understanding of near-wall motion, evaporation behavior and dry pattern of sessile nanofluid droplets is fundamental to a wide range of applications like painting, spray drying, thin film coating, fuel injection and inkjet printing. However, a deep insight into the heat transfer, fluid flow, near-wall particle velocity and their effects on the resulting dry patterns is still much needed to take the full advantage of these nano-sized particles in the droplet. This work investigates the effect of direct absorptive silicon/silver (Si/Ag) hybrid nanofluids via two experiments. The first experiment identifies the motion of tracer particles near the triple line of a sessile nanofluid droplet on a super-hydrophilic substrate under ambient conditions by the multilayer nanoparticle image velocimetry (MnPIV) technique. The second experiment reveals the effect of light-sensitive Si/Ag composite nanoparticles on the droplet evaporation rate and subsequent drying patterns under different radiation intensities. The results show that the presence of nanoparticle in a very small proportion significantly affects the motion of tracer particles, leading to different drying patterns and evaporation rates, which can be very important for the applications such as spray coating and inkjet printing.

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