

Abstract Submitted  
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**Motion of nanoparticle-covered droplet in a square microchannel<sup>1</sup>**

ZHENGYUAN LUO, BOFENG BAI, State Key Laboratory of Multiphase Flow in Power Engineering, Xian Jiaotong University — The flow of complex droplets with contaminated surfaces (e.g., nanoparticle-covered interface) in microchannels with non-circular cross-sections is ubiquitous in nature and various engineering applications, for example, deformable droplets through porous media in underground oil reservoir and droplet transport and manipulation in microfluidic devices. It is also an important fundamental question in the discipline of fluid mechanics. Extensive studies have been dedicated to the study of the motion, deformation and breakup of an individual droplet in cylindrical capillaries or non-circular channels, most of which have been focused on clean droplets. However, little is known about the effects of contaminated surfaces, e.g., nanoparticle-covered interface. In this study, we will show our new numerical results on flow dynamics of complex droplets with nanoparticle-covered interface in a square microchannel. We find the adsorption of nanoparticles tends to assemble at the drop rear and immobilize the drop surface, and thus enlarges the droplet-induced extra pressure loss.

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