

Photoswitchable soft substrates for droplet behavior evaluation upon on-demand softness alteration

Monday, 5 December 2022 16:00 (2 hours)

Softness has shown a significant influence on droplet behavior on soft substrates[1]. Alteration of thickness[2], crosslinking degree or curing time[3] on different spots of PDMS or hydrogels[4] have been shown to provide softness patterns which have been used for droplet movement or durotaxis experiments. For further studies and applications, softness patterns that can be switched on-demand on the surface or below the droplet are of high interest. Here, we introduce a photoswitchable gel which shows significant reversible changes in softness upon UV irradiation. The material is based on entangled reverse wormlike micellar systems[5]. These systems are often based on volatile solvents and very low elasticity as their modulus is in the range of a few Pascals. Therefore, we have enhanced the viscoelastic behavior of the material via addition of silica particles, while the photoswitchable properties were preserved. The material was employed as a soft substrate with adjustable softness to evaluate the wetting ridge formation depending on the local softness of a substrate. Wetting ridges were visualized using confocal microscopy on substrates with different silica content, and later compared before and after UV exposure to the substrate. The high resolution of the photoswitchable softness allows softening of one side of the droplet for the investigation of droplet behavior such as asymmetric spreading.

References

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Session Classification: Poster Session