

Deep learning to analyze sliding drops

Montag, 5. Dezember 2022 16:00 (2 Stunden)

State-of-the-art contact angle measurements usually involve image analysis of sessile drops. The drops are symmetric and images can be taken at high-resolution. The analysis of videos of drops sliding down a tilted plate is hampered due to the low-resolution of the cutout area where the drop is visible. The challenge is to analyze all video images automatically, while the drops are not symmetric anymore and contact angles change while sliding down the tilted plate. To increase the accuracy of contact angles, we present a 4-segment super-resolution optimized-fitting (4S-SROF) method. We developed a deep learning based super-resolution model with an up-scale ratio of 3; i.e. the trained model is able to enlarge drop images 9 times accurately (PSNR=34.9). In addition, a systematic experiment using synthetic images was conducted to determine the best parameters for polynomial fitting of contact angles. Our method improved the accuracy by 21% for contact angles lower than 90° and by 33% for contact angles higher than 90°.

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Sitzung Einordnung: Poster Session