

Memory effects of PNiPAAm brushes in different atmospheres

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Some polymer brushes show a co-nonsolvency effect: They collapse in a mixture of two good solvents at some specific mixing ratio. Previous studies focused on the response of brushes which are entirely covered by a liquid. Here, we concentrate on partial wetting of co-nonsolvent polymer brushes, i.e., on the dynamics of a three-phase contact line moving over such brushes.

We use Poly(N-isopropylacrylamide) (PNiPAAm) brushes and water and ethanol as good solvents. In water/ethanol mixtures, the brush thickness is a non-monotonous function of the ethanol concentration. The memory seen by consecutively depositing drops at the same position. Previously deposited drops adapt the brush and changes the wetting behavior (advancing contact angle) of subsequent drops [1].

One approach to test for the competition between water and ethanol in the brush, is to measure with a water drop in an ethanol-saturated atmosphere. At the three-phase contact line, the air and probably also the brush will transition from an ethanol-rich state to a water-enriched state. Thus the brush might pass through the regime of the co-nonsolvency effect. On large time scales the ethanol enriched gas phase and the water drop will become mixtures of ethanol and water. We present strategies to counter this mixing effect. The memory effect shown above cannot be experienced in an ethanol-enriched atmosphere.

1. Schubotz, S., et al., Memory effects in polymer brushes showing co-nonsolvency effects. *Advances in Colloid and Interface Science*, 2021. 294: p. 102442.

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