

Direct observation of polymer migration near contact line region

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The contact line motion of polymer solution can be affected by polymer migration from the wall near the contact line due to the hydrodynamic interaction between elastic polymer molecules and the solid wall. To observe the migration directly, we investigated the contact line motion of lambda DNA solutions intercalated by YOYO-1 dye during drop spreading. For the solution with the DNA of 48,502bp, the depletion near the contact line appeared strongly at the initial stage of spreading and disappeared due to the movement of DNAs into contact line when the contact line moving is almost stopped. However, the depleted region is almost absent during the contact line motion for DNA-dye solutions composed of fragments of lambda DNA (125-21,226bp size). The results were in accordance with migration theory in that the depletion which depends on molecular weight is observed. These results can support the argument that the detailed contact line motion of polymer solutions should be determined by the relative importance of polymer migration and the increased viscosity and elasticity due to the polymer molecules near the contact line.