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Effect of particle wettability on the stick-slip motion of the contact line DONG-OOK KIM, MIN PACK, ARIF ROKONI, PAUL KANEELIL, YING SUN, Drexel University — Contact line dynamics is crucial in determining the deposition patterns of evaporating colloidal drops. Using high-speed interferometry, we directly observe in real time the stick-slip motion of the contact line and instantaneous drop shape in inkjet-printed pico-liter colloidal drops containing nanoparticles of varying wettabilities. Integrated with optical profilometry, the instantaneous particle deposition rate may also be determined. The results show that the contact line stick-slip motion highly depends on the particle wettability. While the stick-slip motion is observed for the hydrophobic particle case, the contact line continues to depin in the hydrophilic case. A multi-ring deposition is found for the hydrophobic nanoparticles but not for the hydrophilic ones when keeping other parameters the same. This is consistent with the model prediction of the number of particles required to pin at the contact line based on force analysis and motion of particles near the contact line. Using the combined modeling and experiments, the relation between particle wettability, contact line motion, and final deposition morphology are obtained.

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