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Enhanced droplet retention through in-situ precipitation MAHER DAMAK, SEYED REZA MAHMOUDI, MD NASIM HYDER, KRIPA VARANASI, Massachusetts Inst of Tech-MIT — Poor retention of agricultural sprays on hydrophobic plants is an important issue, as large quantities of toxic chemicals end up in soils and groundwater after sprayed droplets bounce off leaves. Here we propose to increase liquid retention on hydrophobic surfaces by in-situ formation of hydrophilic surface defects that pin the impacting drops. Defects are formed through simultaneous spraying of solutions containing opposite polyelectrolyte, which combine on the surface and precipitate. We study individual drop-on-drop impact dynamics with high-speed imaging and analyze the surface after impact. Using these results, we elucidate the mechanism of precipitate formation and droplet retention. We derive a physical model to estimate the energy dissipation by the formed defects and predict the transition from bouncing to sticking, which can be used to design effective sprays. We finally show large macroscopic enhancements in retention of sprays on superhydrophobic synthetic surfaces as well as leaves.

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