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Effect of Tracer Particles on Binary Droplet Coalescence in Liquids JUNGYONG KIM, ELLEN LONGMIRE, University of Minnesota — Pairs of water/glycerin drops were injected into silicone oil and traveled on downward trajectories before colliding. Simultaneous dual-field PIV measurements were obtained to characterize coalescence and rebounding behavior for Weber numbers [We] of 1-50 for a range of collision angles θ below the horizontal. First, both fluids were seeded with TiO_2 for PIV measurement. Then, additional experiments were performed with no tracer particles in the silicone oil to determine whether particles affect the coalescence. When both fluids were seeded, the drops rebounded for $We < 10$ and coalesced for $We > 10$. Based on the current data, this boundary applies for $22^\circ < \theta < 35^\circ$, but shifts to higher We with increasing collision angle. For the experiments with unseeded ambient fluid, the drops rebounded for $We < 10$. However, both coalescence and rebounding occurred for $10 < We < 17$. For cases with seeded ambient fluid, the rupture location was always in the lower portion of the thin film between the drops. However, for cases with unseeded ambient fluid, the rupture location was more variable. Details of these behaviors will be discussed in the presentation. Supported by Petroleum Research Fund (42939-AC9) and NSF (CTS-0320327).

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