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Satellite formation during bubble transition through an interface between immiscible liquids ERQIANG LI, King Abdullah University of Science and Technology, SHABBAB AL-OTAIBI, Saudi Arabian Oil Company, IVAN VAKARELSKI, SIGURDUR THORODDSEN, King Abdullah University of Science and Technology — A bubble can pass through the interface between two immiscible liquids if it is energetically favourable. Once the intermediate film has drained sufficiently, the bubble makes contact with the interface, forming a triple-line and producing strong capillary waves which travel around the bubble and can pinch off a satellite on the opposite side, akin to the coalescence cascade dynamics. We identify the critical Ohnesorge number where such satellites are produced and characterize their sizes. The total transition time scales with the bubble size and differential surface tension, while the satellite pinch-off time scales with the capillary-inertial time of the pool liquid which originally surrounds the bubble. We also use high-speed video imaging to study the contact neck motion. For low viscosity it grows in time with a power-law exponent between 0.44 and 0.50, with a prefactor modified by the net sum of the three interfacial tensions. Increasing the receiving drop viscosity drastically slows down the triple-line motion, when the Ohnesorge number exceeds around 0.08. This differs qualitatively from the coalescence of two miscible drops of different viscosities, where the lower viscosity sets the coalescence speed. We thereby propose a strong resistance from the triple-line.

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