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Complex immiscible drop impact morphology[1] ZIQIANG YANG, YUANSI TIAN, SIGURDUR T. THORODDSEN, King Abdullah Univ of Sci Tech (KAUST) — We present an experimental study of the various impact morphologies which can emerge when a heavy perfluorocarbon (PP1) drop impacts on a water pool. PP1 is immiscible with water and has larger density, but much lower surface tension. The drop deforms into a thin hemispheric layer covering the surface of the impact crater. The subsequent crater collapse leads to a plethora of different bubble or drop-entrapment phenomena, via dimple-formation at its bottom. We build a regime diagram, using different drop sizes and impact velocities, to classify these phenomena, such as air or water entrapped inside the PP1 liquid, or the dimple formation. Capillary waves form novel dimple-shapes, with bamboo-like or telescopic surfaces [1]. Focus is on the formation of the bamboo-like multi-dimples and the evolution process to the telescopic dimples. The width and the depth of the telescopic dimples are studied with the impact velocity. The collapse of these dimples can produce very fine dimples emerging at high speeds, the so-called singular jets. We characterize their velocity, thickness and the number of secondary droplets. REFERENCES: 1. Yang, Z. Q., Tian, Y.S. and Thoroddsen, S. T., 'Multitude of dimple shapes can produce singular jets during the collapse of immiscible drop-impact craters'. Submitted to Journal of Fluid Mechanics (2020).

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