Bubble formation during drop impact on a heated pool

YUANSI TIAN, MUATH ALHAZMI, NADIA KOURAYTEM, SIGURDUR THORODDSEN, King Abdullah Univ of Sci Tech (KAUST) — Ultra high-speed video imaging, at up to 200 kfps, is used to investigate a drop impinging onto a high temperature pool. The room-temperature perfluorohexane drop, which has a boiling temperature as low as 56 °C impacts on the soybean oil pool heated up to around 200 °C, which is overwhelmingly higher than the boiling temperature of the drop. The bottom of the drop is therefore covered by a layer of vapor which prevents contact between the two immiscible liquid surfaces, akin to the Leidenfrost effect. However, as the pool temperature is reduced, one starts seeing contact and the dynamics transition into the vapor explosion regime [1]. At the boundary of this regime we observe some entrapment of scattered or a toroidal ring of small bubbles. Experimental video data will be presented to show this novel phenomenon and explain how these bubbles are formed and evolve. [1] Alchalabi, M., Kouraytem, N., Li, E.Q. and Thoroddsen, S.T. “Vortex-induced vapor explosion during drop impact on a superheated pool.” Experimental Thermal and Fluid Science. 87, 60-68, (2017).