Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Bubble growth during "magic carpet breakup" of a drop on a heated substrate[1] RYUTA HATAKENAKA, Japan Aerospace Exploration Agency, KIRSTEN HARTH, Otto-von-Guericke-Universität Magdeburg, ILIA V. ROISMAN, CAMERON TROPEA, Technische Universität Darmstadt, DETREF LOHSE, Universiteit Twente, YOSHIYUKI TAGAWA, Tokyo University of Agriculture and Technology — Drop impact onto a hot substrate results in a multitude of different outcomes, depending on the substrate temperature and the impact parameters. In our previous study (R. Hatakenaka et al., *Int. J. Heat Mass Transf.*, 2019), a new outcome named magic carpet breakup was identified under reduced ambient pressure (1 - 10 kPa) for water drops impinging onto a superheated smooth substrate with moderate impact velocity (0.46 m/s). Droplets are repelled from the hot surface so violently, that they spread out to a flattened shape in an explosive manner. Here we observe the existence of a growing vapor bubble underneath the drop. Its growth between the drop and the substrate is directly observed via high-speed total internal reflection (TIR) imaging. The bubble emerges at the center of impact point, grows, and finally coalesces with some additional smaller bubbles. Similar observation has been already reported by Yu et al. (*Soft Matter*, 2019), however no quantitative data was presented. We will evaluate the bubble growth rate via image analysis and discuss an applicability of a classical bubble growth model to this problem.

[1]This work was supported by JSPS KAKENHI Grant Numbers JP20H00223 and JP20K14676, and German Science Foundation grant HA8467/2-1 and HA8467/1.

Ryuta Hatakenaka
Japan Aerospace Exploration Agency

Date submitted: 03 Aug 2020 Electronic form version 1.4