Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The life cycle of individual boiling bubbles: Insights from beyond optical imaging SCOTT PARKER, SUNG CHUL BAE, DAVID CAHILL, STEVE GRANICK, University of Illinois — With a high-speed camera, we have investigated the dynamics of individual vapor bubbles boiling on a laser-heated surface. Their sizes and shapes as they grow and depart from a surface are correlated with simultaneous thermal imaging measurements of the boiling surface using thermoreflectance-based microscopy to measure temperatures of individual stochastic events. Analysis of both the thermal profiles and the bubble shapes suggests the presence of an evaporating liquid microlayer under the developing bubble. Tuning surface and heating properties, we control the shapes of bubbles, ranging from regular periodic growth and departure to stochastic bubbles which exhibit rapid cavitation-like expansion and collapse. Unlike typical cavitation bubbles which collapse and form jets pointed towards the surface, jets from bubbles observed during boiling were observed to be directed away from the surface. By tuning the wettability of the substrate, we will report on how wettability affects the strength and direction of these jets.

Scott Parker
University of Illinois

Date submitted: 10 Nov 2011 Electronic form version 1.4