DFD13-2013-000383

Abstract for an Invited Paper
for the DFD13 Meeting of
the American Physical Society

Dynamic equilibrium explanation for nanobubbles unusual temperature and saturation dependence

L. GARY LEAL, UCSB

Recent experimental evidence demonstrates that nanobubbles exhibit unusual behavior in response to changes in temperature and gas saturation in the liquid, an observation that may shed light on the mysterious origin of their stability. In this talk, we discuss an alternate formulation of the dynamic equilibrium mechanism for nanobubbles that predicts rich behavior in agreement with these measurements. Namely, we show that stable nanobubbles exist in narrow temperature and dissolved gas concentration ranges, that there is a maximum and minimum possible bubble size, and that nanobubble radii decrease with temperature. We also discuss these predictions in the context of other current hypotheses for nanobubble stability such as the recently-proposed diffusive "traffic jam" model.