Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

The promotion effect of polymer nanoparticles on laser-induced thermal cavitation MAN HU, FENG WANG, DAOSHENG DENG, Fudan University, Shanghai, China — Laser impacting on liquids, ranging from a single droplet to soft biological tissues, can generate cavitation. By immersing nanoparticles into water, cavitation can be manipulated. Here, we report CO_2 laser impacting on distilled water with polymer nanoparticles immersed in to produce thermal cavitation at the air/water interface. The promotion effect of nanoparticles on the inception of cavitation is investigated. With proper concentration nanoparticles being introduced in, thermal cavitation is clearly observed at the air/water interface from high speed imaging, but no cavitation for water with no nanoparticles. Based on this phenomenon, three regimes (no cavitation, cavitation, and pseudo-cavitation) are identified within a broad range of nanoparticles concentration and size. Moreover, this interfacial cavitation allows the direct visualization of spatial-temporal evolution of temperature, which reveals that the polymer nanoparticles not only act as preexisted nuclei to promote nucleation for cavitation, but also likely affect temperature to change the nucleation rate as well.

Feng Wang
Fudan University, Shanghai, China

Date submitted: 01 Aug 2019 Electronic form version 1.4