Abstract Submitted
for the OSS17 Meeting of
The American Physical Society

Monitoring the flash-freezing of super-cooled water droplets using high speed imaging and temperature measurement HOK WAI CHANG, KHALID EID, Miami University — The freezing of water droplets on surfaces is relevant to many technological applications and has a rich behavior. We will present a systematic study of the super-cooling and flash freezing processes of individual water droplets. High speed imaging and rapid temperature measurements are used to compare and contrast that with the normal cooling and freezing of the same droplets. Water droplets can be 'super-cooled' to a few degrees below freezing without changing to the solid phase. Once an initial ice micro-crystal forms, it spreads to the outer parts of the droplet within a few milliseconds, while the inside of the droplet remains in the liquid form. The latent heat released causes the temperature of the liquid part to rise to 0 ^{o}C instantly. The rest of the droplet then freezes gradually and the droplet takes a peculiar dome shape with a spike at the top. The role of droplet contact angle and surface roughness in this behavior will be discussed.

Khalid Eid
Miami University

Date submitted: 07 Apr 2017 Electronic form version 1.4