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Adherent nanoparticles-mediated micro- and nanobubble nucleation CHON U CHAN, LONG QUAN CHEN, Division of Physics and Applied Physics, School of Physical and Mathematical Science, ALEXANDER LIPPERT, Lam Research AG, Villach, Austria, MANISH ARORA, CLAUS-DIETER OHL, Division of Physics and Applied Physics, School of Physical and Mathematical Science — Surface nanobubbles are commonly nucleated through water-ethanol-water exchange. It is believed that the higher gas solubility in ethanol and exothermic mixing leads to a supersaturation of gas in water. However details of the nucleation dynamic are still unknown. Here we apply the exchange process onto a glass surface deposited with nanoparticles and monitor the dynamics optically at video frame rates. During exchange bubbles of a few micron in diameter nucleate at the sites of nanoparticles. These microbubbles eventually dissolve in ethanol but are stable in water. This agrees with the nucleation process observed for surface nanobubbles. Also we find a reduction of surface attached nanobubbles near the particles, which might be due to gas uptake from the microbubble growth. Finally, high speed recordings reveal stick-slip motion of the triple contact line during the growth process. We will discuss possibilities of utilizing the findings for contamination detection and ultrasonic cleaning.

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