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Electrolytic Bubble Growth on Pillared Arrays[1] KENNETH LEE, OMER SAVAS, Department of Mechanical Engineering, University of California at Berkeley — In current energy research, artificial photosynthetic (AP) devices are being designed to split water and harvest hydrogen gas using sunlight. In one such design, hydrogen gas bubbles evolve on catalytic surfaces of arrayed micropillars. If these bubbles are not promptly removed from the surface, they can adversely affect gas evolution rates, water flow rates, sunlight capture, and heat management of the system - all of which deteriorate device performance. Therefore, understanding how to remove evolved gas bubbles from the pillar surfaces is crucial. Flow visualization of electrolytic bubble nucleation and detachment from the catalytic pillar surfaces has been conducted. The bubble departure diameter and lift-off frequency are extracted and compared with known correlations from boiling heat transfer. Bubble tracking indicates that bubble detachment is enhanced by local interactions with neighboring bubbles. These observations suggest how hydrogen gas bubbles can be effectively removed from pillared surfaces to prolong AP device longevity.

[1]Joint Center for Artificial Photosynthesis, a U.S. Department of Energy (DOE) Energy Innovations Hub

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