Enhancement of Electrochemical and Photoelectrochemical Hydrogen Production Performances by Applying M13 Bacteriophage Templated Superaerophobic Hydrogels

박진우, 전다솜, 신창환, 김현우, 장지욱, 류정기, 이동욱†
Ulsan National Institute of Science and Technology (UNIST)
(dongwoog.lee@unist.ac.kr†)

The efficient removal of gas bubbles in (photo)electrochemical gas evolution reaction is very important in terms of electrochemical active surface area. Recently, many researchers have attempted to impart bubble-repellent properties (so-called superaerophobicity) to electrodes by controlling their microstructures. However, most of these approaches have limitations, as they are material specific, difficult to scale up, and inappropriate with photoelectrochemical applications. We report a simple strategy that addresses existing limitations by depositing hydrogels to accomplish superaerophobicity to desired electrode surfaces. In this study, we deposited a M13 bacteriophage template transparent hydrogel onto electrochemical and photochemical electrodes. The deposited hydrogel overlayer facilitated the elimination of produced hydrogen bubbles and significantly improved the electrodes' performances by minimizing the concentration onverpotential and maintaining high catalytic activity. We suggest that this study can contribute to the practical application of various types of (photo)electrochemical gas-evolution reactions.