Long-term Durable Oxygen Evolution Catalysis by Suppressing Buoyant Force from Structural Integrity of Electrode

김성순, 최영문[1], 이선제[1], 김광희[1], 박종혁[1,†]
연세대학교; [1]연세대학교 화공생명공학과
(lutts@yonsei.ac.kr†)

Recent progress in the development of water oxidation electrocatalysts has mainly focused on achieving highperformance in a single measurement, while the importance of durability has not yet been deeply studied. Additionally, oxygen evolution reaction (OER) involves a phase transition from a liquid to a gas, and thus, the removal of the generated oxygen bubble is an important factor for improving the activity or maintaining the performance. In this study, 3D ordered nanoporous nickel electrode is synthesized with a thickness of 5 μm by using a templating method composed of proximity field nanopatterning (PnP) and electrodeposition followed by introduction of NiFe(OH)2 on the nickel electrode to increase the OER activity. The unique nanopore array structure of the electrode has advantages of not only an enlarged active surface area but also the fast removal of oxygen bubbles by spatial confinement effect. Consequently, the NiFe-decorated 3D ordered nanoporous nickelel ectrode shows a highly efficient oxygen-evolving ability with a turnover frequency of 2.9s−1 and an ultra long durability of 300h.