

Hydrogen electrochemical sensor using tetramethylammonium hydroxide pentahydrate as a proton conductor

이원희, 차종호, 이 혼*

KAIST

(h_lee@kaist.ac.kr*)

Hydrogen, carbon-free and nonpolluting energy source, has been of interest to scientists and engineers as one of the alternatives to fossil fuels. However, its explosion concentration limit (4%) requires effective H₂ detection system for the safe application of a variety of H₂ based devices. Recently, Nafions have been widely used to fabricate such devices as fuel cells or electrochemical sensors. Despite of high ionic conductivity of the polymer film, it is difficult to be applied for the proton conductor owing to its chemical stability and high cost. Tetramethylammonium hydroxide pentahydrate (Me₄NOH•5H₂O), which is one of the ionic clathrate hydrates, have received growing attention as another potential proton conductor due to its high thermal stability and ionic conductivity as well as low price of the raw material. In this study, we fabricated new electrochemical sensor assembly based on Me₄NOH•5H₂O and tested the sensing property for H₂ detection. The novel sensor designed shows high sensing performance at the various H₂ concentrations in N₂ gas and excellent selectivity to H₂ gas.