

### Electrode fabrication by electrodeposition for H<sub>2</sub> sensor based on ionic clathrate hydrate

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Tetramethylammonium hydroxide pentahydrate (Me<sub>4</sub>N<sup>+</sup>OH<sup>-</sup>•5H<sub>2</sub>O), one of the representative proton-conducting clathrate hydrates, is able to play a role as a solid electrolyte of electrochemical H<sub>2</sub> sensor. The superionic conductivity of the material arises from the proton hopping through the water-hydroxyl host network. For the better sensing performance, we fabricated an anode of the electrochemical sensor by electrodeposition because catalyst particle size and porous microstructure in relation to the hydrogen splitting reaction at the electrode, can be controlled by the electrochemical technique. Palladium was selected as a catalyst due to relatively low price compared to platinum. The amount of palladium nanoparticles electrodeposited was profoundly affected by the surface characteristic of the carbon electrode and stirring rate. The sensing performance was dependent on the catalyst amount as well as applied voltage.