The Structure and Properties of Pulsed DC Sputtered Nanocrystalline NbN Coatings for Proton Exchange Membrane Fuel Cell

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We investigated the pulsed direct current (DC) sputtering deposition as a tool for preparing proton exchange membrane fuel cell (PEMFC) electrodes with improved performance and catalyst utilization. Sputtering deposition techniques are good candidates for the fabrication of electrodes used for PEMFCs. However, little is known about the effects of this pulsed plasma on the performance of PEMFC electrodes. Therefore, this study applied pulsed sputtering to prepare PEMFC electrodes and investigated the effect of pulse parameters in electrode coating on electrode/cell performance [1]. As a high density of ion and activated species can be produced in pulsed plasma, pulsed sputtering can achieve a sufficient reaction and a dense microstructure at a low deposition temperature. NbN coatings exhibit extremely high corrosion resistance, high melting point, chemical inertness and good thermo-dynamical stability [2].

In this work, we report the crystallite size, three dimensional surface morphology and cross-sectional microstructure of NbN coatings prepared by pulsed sputtering under various plasma conditions. Corrosion resistant and mechanical properties of NbN coatings were also presented by utilizing pulsed DC generator.

참고문헌

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