

Evaluation of electrochemical properties of rGO-composite materials (Ni/YSZ, SYTN) as anodes of solid oxide fuel cells

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Ni/YSZ, which is currently the most widely used material as an anode material for a solid oxide fuel cell, shows severe performance degradation due to carbon deposition when hydrocarbons are used as fuel. Perovskite, which is being researched and developed a lot to compensate for this problem, has low conductivity and shows low performance. To solve the above problem, rGO was added to Ni/YSZ and the SYTN, and a performance comparison experiment was conducted. The microstructure and physical properties of the anode were confirmed by XRD, SEM, XPS, and Raman. The addition of rGO formed grain boundary and increased the mixed ionic and electronic conductivity (MIEC) properties. As a result, compared to hydrogen fuel, rGO-Ni/YSZ containing 1 wt% of rGO showed almost similar performance without reducing the performance of 30-40% that occurs when using methane fuel. In addition, it showed a performance increase of more than 50% in SYTN. Since this experiment and research are in the initial stage of introduction of the rGO-Ni/YSZ composite anode, it is necessary to compare the performance according to the content of rGO and further analyze the physical and chemical properties.