

Characteristics of Y doped SrTiO₃ for biofuel in SOFCs

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Due to the high operating temperature, SOFCs can be operated with various hydrocarbon fuels or methane-based bio-fuels. In general, the SOFC system adopts a fuel clean-up part to remove the impurities, especially sulfur compounds and a steam reforming process to produce hydrogen without carbon deposition by control of steam to carbon (S/C) ratio. Recently, some researchers begin to study a SOFC system directly running on hydrocarbon fuels, which can increase system efficiency because of no addition of water and also can increase thermodynamic efficiency if the hydrocarbon fuel directly and electrochemically reacts with oxygen ions. However, a nickel-based anode, which is widely used as an anode material for SOFCs, has disadvantages of sulfur poisoning and carbon deposition when using hydrocarbon-based fuels only. In this study, the perovskite structure - yttrium doped SrTiO₃ (Sr_{0.92}Y_{0.08}TiO_{3-δ}; SYT) has been investigated as the alternative SOFC anode materials when running with CH₄ fuel (including H₂S). The electrochemical properties of the SYT anode will be discussed and stabilities and long-term performance of single cell with the SYT anode will be characterized in terms of sulfur poisoning and carbon deposition.