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Novel nano electrolytes for Solid Oxide Fuel Cell application and its current Status: A review

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Abstract

The growing energy needs of modern world demand more advancement in the efficiency of energy systems. Solid oxide fuel cells (SOFC) play a major role in the clean energy technology due to its high efficiency, fuel flexibility and low pollution. Electrolyte is one of the key components of SOFC. CeO_2 -based solid electrolytes, which have high oxygen ion transport, are one of the main candidates as electrolyte for SOFC. Nano structured CeO_2 -based solid electrolytes have enhanced physical and electrical properties which help to improve the performance of the SOFC. High operating temperature of electrolyte require high ionic diffusion with minimum electronic conduction. Mostly, open lattice structure: Fluorite are used as solid electrolytes for SOFC.Cerium oxide(ceria) became the best choice for working at intermediate temperature due to their unique properties for widespread commercial applications. Acceptor doped CeO_2 has shown enhancement in the ionic conductivity due to their smaller particle size, better structural properties, and morphology. Co-doping approach are found to be most cost-effective method with an enhanced ionic conductivity. Ceria (CeO_2) co- doping reported to achieve higher ionic conductivities than those in singly doped systems. In this context, thin film deposition of electrolyte has drawn attention in the field of research due to their less ohmic loss with a low operating temperature. This article provides a comprehensive review with respect to the material requirement of SOFC electrolyte, the out-turn of the two-process doping and co-doping on the structural and electrical properties of the ceria based electrolyte and it open future directions towards pursuing SOFC research.

Biography

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