

# International Conference and Expo on **Ceramics**

August 17-18, 2015 Chicago, USA

## Ceria based solid electrolytes for IT-SOFCs - An overview

**Om Parkash**

Indian Institute of Technology (BHU), India

Solid oxide fuel cells (SOFCs) are clean source of energy generation. Solid electrolyte constitutes an important component of the SOFCs. YSZ has been in use for this purpose. But it exhibits adequate oxygen ions conductivity at high temperature viz 900-1000°C. This high temperature puts lot of constraints on the use of materials in the construction of the cell and cell stacks. For the last few years, rare earth doped ceria has received a great deal of attention due to enhanced ionic conductivity in the intermediate temperature range 500-700°C. Samarium doped ceria (SDC) and gadolinium doped ceria (GDC) have been reported to have high ionic conductivity among trivalent lanthanides. But Sm and Gd are very costly. Hence, there is an increasing interest to identify and develop new ceria based oxides using cost-effective dopants for technological applications. A new co-doping approach has been introduced to further increase the conductivity in the intermediate temperature range and to reduce the cost also. An improvement in the conductivity has been found by co-doping. Recently, the research has been going on the ceria/salt based nanocomposite solid electrolyte to further increase the ionic conductivity at low temperature viz. 300-600°C. The composites, composed of two phases one is doped ceria crystalline phase and other is amorphous salt (carbonate, chloride, hydrate or sulphate), show conductivity in the range  $0.01-1\text{ S-cm}^{-1}$  at 400-600°C and suppress the electronic conductivity effectively. The present overview summarizes the investigations on the ionic conductivity of singly and co-doped ceria and nanocomposites based on ceria/carbonate dual phase.

### Biography

Om Parkash did his MTech and PhD in Material Science in 1975 and 1977 respectively from Indian Institute of Technology (IIT), Kanpur, India under C N R Rao, F.R.S. He joined as a Faculty Member in School of Materials Science & Technology, Institute of Technology, Banaras Hindu University, Varanasi, in 1980. He joined as a Professor of Electrical & Electronic Ceramics in the Dept. of Ceramic Engineering of the institute in 1998. He has been working on 'Solid electrolytes and nanocomposites based on doped and co-doped ceria for intermediate and low temperature solid oxide fuel cells'. The objective of this research is to develop low cost solid electrolytes for the above purpose.

[oprakash.cer@itbhu.ac.in](mailto:oprakash.cer@itbhu.ac.in)

### Notes: