Cecilia Mortalo, Chem Sci J 2017, 8:2(Suppl)
http://dx.doi.org/10.4172/2150-3494-C1-008

High temperature ceramic ionic conductors for hydrogen separation

Cecilia Mortalo
CNR-ICMATE, Italy

The production of pure hydrogen usually requires its extraction from a gas mixture. One of the critical stages related to the use of hydrogen as an energy carrier is the development of efficient and competitive techniques that separate hydrogen from other by-products such as steam, hydrocarbons, carbon dioxide and other gases. Membranes for hydrogen purification represent an appealing alternative to the current commercially available pressure swing adsorption technology. In this context, mixed ionic and electronic conducting (MIEC) materials are considered attractive as dense ceramic membranes due to their extremely high selectivity at high temperature (≥ 600°C): hydrogen is incorporated into their lattice as charge protonic defects, thus providing a non-galvanic separation, i.e. without external power. Furthermore, the properties of these oxides (i.e. working temperatures, durability) endow membranes that could be directly integrated into industrial processes or used in the catalytic membrane reactors. Recently, $BaCe_{0.65}Zr_{0.20}Y_{0.15}O_{3-\delta}$ and doped-ceria composites were explored by our group as potential membrane for hydrogen separation, reaching hydrogen flux values among the highest ever reported for bulk MIEC membranes (0.27 $mL \bullet min^{-1} \bullet cm^{-2}$ at 755°C). 1 This talk provides a comprehensive overview of the recent trends in such MIEC materials for H_2 separation. The long term stability of the investigated systems under harsh environments containing H_2O vapour, CO, CO_2, and sulphides is also shown.

Biography

Cecilia Mortalo is graduated in Chemistry and has completed his PhD at University of Modena and Reggio Emilia (Italy) in 2005. Since 2005 she has been a researcher at the Institute of Condensed Matter Chemistry and Technologies for Energy of the Italian National Research Council. Her research activity is focused on the preparation and study of advanced ceramic ionic conductors for high temperature energy applications, in particular solid oxide fuel cells and hydrogen separation membranes. She has published more than 20 papers and 60 proceedings of national and international conferences.

cecilia.mortalo@cnr.it

Notes: