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Liquid hydrocarbons internal reforming in a solid oxide fuel cell reactor

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Introduction: In the present work, iso-octane and steam are co-fed in a solid oxide reactor of the type Cu-CeO_2/YSZ/Pt. The impact of temperature, feed composition and over potential on products' distribution and electro-catalytic activity is examined. Furthermore, the as prepared cell was also electrochemically characterized employing typical fuel cell measurements and AC impedance spectroscopy.

Results & Discussion: Cu-CeO_2 composites exhibited high (electro-) catalytic activity and stability. Fuel cell experiments showed that the achieved power densities were substantially increased with temperature and i-C_8H_{18}/H_2O feed molar ratios.

Conclusions: The obtained results show that i-C_8H_{18} is efficiently reformed by H_2O to syngas over Cu/CeO_2 composites. Under open circuit conditions, the distribution of products is also influenced by the associated i-C_8H_{18} thermal/catalytic decomposition reactions, while electro-oxidation of combustible species is prevailing during anodic polarization. Under fuel cell operation, the electrochemical performance of Cu-CeO_2 was investigated by voltage-current density-power density and AC impedance measurements. The achieved power output was enhanced at higher cell temperatures and C/H_2O ratios.

Biography

A Al-Musa has completed his PhD from Loughborough University, UK. He is an Associate Professor of Research at the National Center for Combustion and Plasma Technologies, King Abdulaziz City for Science and Technology (KACST), Saudi Arabia.

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