Advanced electroceramics for high temperature electrochemical conversion of CO_2

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Abstract

Electrolysis technologies provide an efficient route for the storage of renewable energy into chemicals. These processes involve the production of H_2 from H_2O often using the surplus of renewable energy. Several recent research works in this field have reported on the high temperature co-electrolysis of H_2O and CO_2 to produce syngas. This process pursues the dual purpose of storing the excess of energy from intermittent renewable power sources and the reduction of CO_2 emissions in the atmosphere by efficient recycling. Today, one of the most promising electrochemical technologies for the reduction of CO_2 is certainly the high temperature solid oxide electrolysis (SOEC). In this communication, we report on the most recent achievements in this field obtained at CNR-ITAE with the main focus on the development of materials, electrochemical characterization of cells and analysis of effluent gas. In this communication, we also discuss how to optimise the operating conditions in order to improve the yield of methane obtained directly from the co-electrolysis of H_2O and CO_2.

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