Institute Interest Seminar Series, I^{2}CNER
December 15th 2016

Functional ceramics as electrodes for Solid Oxide Cells

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ABSTRACT: Functional ceramics hold certain internal phenomena that give them some interesting properties. For example, their mechanical and electrical properties have a large range of application in the field of energy. In a virtuous circle of energy, Solid Oxide Fuel Cells (SOFCs) are utilised for stationary electricity generation (from H_2 and O_2) while Solid Oxide Electrolyzer Cells (SOECs) allow the storage of energy in chemical form (H_2). In those devices, several electrochemical processes are at the heart of conversion between electrical and chemical energies, some of which are limiting. For instance, this is the case of the dissociation of the oxygen on the side of the air electrode of a SOFC. The design of new materials, based on the perovskite structure for example, is necessary for improvements. Equally, the fundamental understanding of the interfacial catalytic processes and of the degradation events taking place at the surface of the metal oxide electrodes is a key to a better control and to the durable and efficient operation of the device.