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From perovskite to more complex structure-type materials for new sofc electrodes

Apresentador: Prof. Dr.Gilles H. Gauthier
Gilles H. Gauthier
Universidad Industrial de Santander (UIS), Escuela de Ingeniería Química, Bucaramanga, COLOMBIA

The development of Solid Oxide Fuel Cells (SOFCs) for use at intermediate temperatures and/or with complex (hydrocarbon) fuels at the anode give rise to a strong research activity in which at least 80% of the new developed materials concern compounds of perovskite or related structure. An SOFC is built of an electronically insulating electrolyte and two conducting electrodes for which the required physical and chemical characteristics are completely different. Due to the ability of the structure to dissolve an infinite range of elements and adopt different kinds of crystal arrangement (from the classical cubic to the more complex hexagonal and lamellar perovskites, and composites thereof), it opens to the researcher the possibility to tailor both the electrical and (electro)catalytical properties by the subtle game of cationic substitutions. The principles of SOFC will be very briefly reminded underlining the main features of both electrode materials. Then, the different families of compounds will be described, from the historical (e.g. the Sr-doped LaMnO3 and Ni/YSZ cermets used for cathode and anode, respectively) to the more actual ones (Ruddlesden-Popper phases R2NiO4+δ (R=La and/or Nd) and ordered perovskites BaGdCo2O5+ for cathodes, Sr-doped La(Cr,Mn)O3 and La or Y-doped SrTiO3 for anodes), opening the gate to new research axis for both components.