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Ni/YSZ cermet sputter deposited under reactive atmopsheres: potential anode for SOFC

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Solid Oxide Fuel Cell is an electrochemical device which converts a chemical energy to electrical without greenhouse gas emission. SOFC cell is composed by a dense electrolyte and two porous electrodes (anode and cathode) and fuel cell stack are an association of many single-cells joined by a current collector. The conventional materials employed in the SOFC core are Yttria Stabilized Zirconia (YSZ) for electrolyte, lanthanum strontium manganite (LSM) for cathode and cermet Ni-YSZ for anode.
Nowadays, the aim of researcher is to decrease the operating temperature of 1200 K to 900 K to reduce the cost of each component and to increase the lifetime of the cell. Nevertheless, one major problem of this goal is the decrease of fuel cell performance at lower temperatures. Among the solutions involved to overcome this drawback, the synthesis of each component of a single-cell as thin films deposited on a current collector support to reduce the electrolyte resistance and increase the electrode reactivity seems to be the convenient way.
In this paper, we present some recent results obtained on Ni-YSZ cermet coatings elaborated by magnetron co-sputtering from metallic targets in various Ar-O_2 mixtures. After a description of the experimental device, a first part will be dedicated to their chemical, microstructural and structural characterisation (SEM, XRD,...) in relation with the magnetron sputtering deposition parameters. In the second part, the electrical properties of the film are determined by four probe method as a function of the temperature under different atmospheres.

Keywords
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