DEVELOPMENT OF CATHODE MATERIALS BY PLASMA PROCESS AT ROOM TEMPERATURE

Mehrdad Nikravec, Frederic Rousseau, Daniel Morvan, and Jacques Amouroux

Laboratoire de Génie des Procédés Plasmas et Traitement de Surfaces, University of Pierre and Marie Curie, Ecole Nationale Supérieure de Chimie de Paris, 11 rue Pierre et Marie Curie 75005 Paris, France.
nikravec@ext.jussieu.fr

The Radio-Frequency cold plasma leads to produce high concentration of reactive species due to the collisions of energetic electrons with molecules. In this process fine droplets of the aqueous precursors (nitrates) are sprayed through an Ar-H2 plasma reactor equipped with a nozzle. Under the phenomena due to the wave shocks produced by the nozzle and the oxidant properties of plasmas containing H2O and O2, the decomposition of nitrate precursors leads to the formation of thin layers of La1-xSrxBaMnO3. The plasma parameters permit to control the purity and stoichiometry of the deposits.

The properties of the deposits are controlled by XRD, SEM, TEM and impedance measurements. The infrared analysis of the deposits permits to determine the effect of the plasma power and the oxygen flow on the conversion rate of the precursors.

Figure 1: Decomposition of nitrate precursors depending on the applied plasma power for deposits of La0.7Sr0.3MnO3.

Figure 2. Arrehnius plots of conductivity for La0.7Sr0.3MnO3 deposited at oxygen rate 25% and 50% in plasma gas, plasma power = 3.6 kW. Comparison with the conductivity of La0.8Sr0.2MnO3 achieved by liquid mixture method [6].

Figure 3. Electron diffraction achieved by Transmission Electron Microscope shows a monoclinic crystallographic system.