3RD BRAZIL MRS MEETING

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SYMPOSIUM E:

PROGRESS ON DEVELOPMENT OF ELECTROCERAMIC MATERIAIS (Joint Symposium: IV Brazilian Symposium on Electroceramics)

Symposium Organizers:

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Tungsten-doped SrBi2Nb2O9 (W-SBN) solutions (1 and 5 mol%) were prepared by the polymeric precursor method and were used for deposition of thin films by spin-coating on Pt/Ti/SiO2/Si substrate. The films were treated in a domestic microwave oven, using a SiC susceptor placed under the substrate. The susceptor absorbs the microwave energy and transfers the heat to the film. It was verified a decrease in the crystallization temperature of tungsten-doped SrBi2Nb2O9 films from 600 ºC to 700 ºC in microwave processing, when compared to undoped films treated in conventional oven. Moreover, the crystallization was reached in a reduced time - 10 min. The films presented the perovskite SrBi2Nb2O9 phase as verified by X-ray diffraction using Cu Kα radiation. 1 mol% W-doped film is polycrystalline, conversely the 5 mol% W-doped one revealed a preferential orientation in 00c direction. Rounded and homogeneous grains were observed by atomic force microscopy for all samples. The concentration of dopant associated with the microwave treatment process influence the orientation of the samples studied. Furthermore, the microwave process reduces the time of thermal treatment.

E - P022 FERROELECTRIC TI-DOPED SRBI2NB2O9 THIN FILMS OBTAINED USING A MICROWAVE OVEN

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Ferroelectric SrBi2Nb2O9 (SBN) thin films doped with titanium were prepared by the polymeric precursor method. The films were deposited by spin coating onto Pt/Ti/SiO2/Si substrate and crystallized using a domestic microwave oven. The doped-SBN solutions were prepared by adding 10 mol% of Ti to the SBN precursor solution. The films were treated in a microwave oven for 10 min at 600, 650 and 700 ºC with a 230 ºC/min heat rate and the SiC susceptor placed below the substrate. Structural and microstructural characterizations were performed by X-ray diffraction (XRD) and atomic force microscopy, respectively. A fluorite phase was observed for the SBN film treated at 600 ºC. However, when it was treated at 650 and 700 ºC, the perovskite SBN phase was verified. A preferential orientation in the 00c direction was observed as the temperature increased, verified by XRD and electron backscattered diffraction. The C-V measurements for film treated at 600 ºC showed a typical butterfly-like curve, characteristic of a ferroelectric material. The remanent polarization and coercive field at 60 Hz were 2.8 μC/cm² and 63 KV/cm, respectively. Films treated at 650 ºC presented dielectric constant and coercive field of 42 and 0.05, respectively, at 100 KHz. The study of the electric characteristics for the films treated at 700 ºC was not possible, probably due to the orientation and the degradation of the interfaces substrate / film or electrode / film.

E - P023 ELECTRICAL BEHAVIOR OF ZIRCONIA-YTTRIA/ZIRCONIA-MAGNESIA COMPOSITE MATERIALS UNDER OXYGEN AT HIGH TEMPERATURES

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(ZrO2: 3 mol% Y2O3)0.5 (ZrO2: 8 mol% MgO)0.5 composite ceramic materials have been prepared by solid state synthesis, pressing and sintering at 1500 oC. Phase identification has been done by X-ray diffraction and the electrical properties have been studied by impedance spectroscopy in the 5 Hz – 13 MHz frequency range at 460 oC. An experimental setup was used inside a tubular furnace for measurement the electrical signal (emf) generated to monitoring oxygen activity in gases at temperatures in the 500oC - 1200oC range. The responses of the tubular composite pellets to oxygen and argon were measured as a function of time to evaluate the response time of the sensor. The main results show that this composite is partially stabilized, the emf stabilizes at approximately 1000 oC, and the electrical signal at that temperature depends on the amount of oxygen.

E - P024 PREPARATION AND CHARACTERIZATION OF SNO2.NB2O5.FE2O3 AND SENSOR PROPERTIES

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