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Crystalline $SrTiO_3$ nanoparticles obtained by Hydrothermal Microwave synthesis

G.F.Teixeira*(1), M.G.S. Costa(1), M.A.Zaghete(1), E.Longo(1), J.A.Varela(1)
(1)LIEC- Laboratório Interdisciplinar de Cerâmica – UNESP (IQAr) –e-mail:guilmina@hotmail.com

Abstract: Ultrafine $SrTiO_3$ powders were prepared by Microwave-Hydrotherma synthesis (M-H) at 180°C for different times (30 min, 1 and 2 hours) .X-Ray diffraction (XRD) STUDIES showed single crystalline phase for samples treated from one hour. Photoluminescende (PL) properties at room temperature and morphology these powders have been investigated.

There any many advantages in the hydrothermal preparation of nanoparticles of oxides with morphological control(1). The $SrTiO_3$ (STO) is a know-well perovskite with a large dielectric constant chemically stable because of that is good candidate for optical applications. The nanoparticles were synthesized by microwave hydrothermal method (M-H)(2,3) at 180°C for different times (30 min, 1 and 2 hours) without the presence os templates additives. Aqueous solution of stroncium nitrate [$Sr(NO_3)_2$] 0,31 mol.L-1 and titanium (IV) isopropoxide [$C_{12}H_{28}O_4Ti$] were used as starting chemicals. KOH aqueous solution 1,8 mol.L-1 was used as catalyst of hidrothermal reaction. M-H heating was done in a microwave digestion system (CEM Corporation - MARS 5 Microwave Accelerated Reaction System).After the M-H tratments the solid and solution phase solution were separated by centrifugation before characterization. The X-ray diffraction, SEM-FEG as well as measurements of photoluminescence (PL) emission were used for monitoring the formation of a perovskite phase with random policrystalline distorcion in the structure. DRX, Fig 1, show the formation of purê $SrTiO_3$ crystalline phase goes materials obtained starting from 1 hour of synthesis, for smaller times, 30 min, it was also observed the phase $SrCO_3$. Emission spectra, Fig 2, with fixed excitation wavelength 350.7nm, showed higher valor to powder obtained with 2 hours of treatment. The high intensity of photoluminescence emission in the 470 nm range was found to be correlated with the presence of nanoparticles size(4).

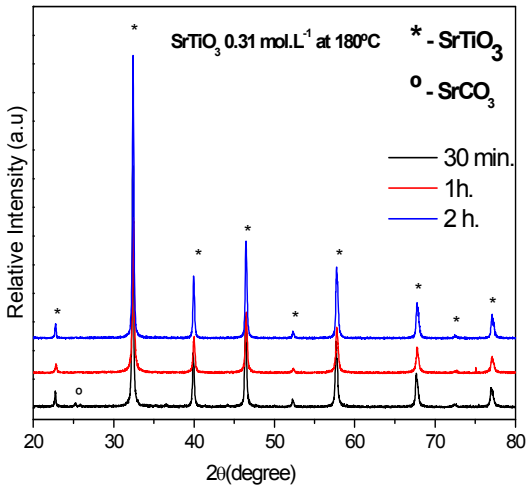

Figure 1: X- Ray diffraction patterns of $SrTiO_3$ synthesized by of M-H at 180 °C for different times laser

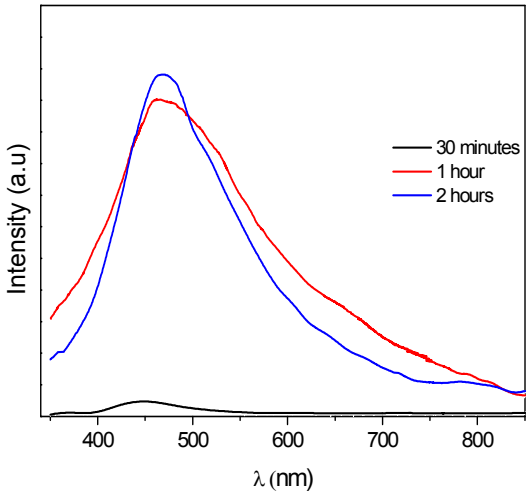

Figure 2: Room temperature photoluminescence spectra crystalline $SrTiO_3$, excited with the 350,7 nm.

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