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Low Temperature Powders Synthesis of la1-xMgxAlO3 through Sol-Gel Method

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Abstract : Powders of La1-xMgxAlO3 ($0 \leq x \leq 5$) oxides, with large surface areas were synthesized by sol-gel process, utilizing citric acid. Heating of a mixed solution of CA, EtOH, and nitrates of lanthanum, aluminium and magnesium at 70°C gave transparent gel without any precipitation. The formation of pure perovskite La1-xMgxAlO3, occurred when the precursor was heat-treated at 800°C for 6 h. No X-ray diffraction evidence for the presence of crystalline impurities was obtained. The La1-xMgxAlO3 powders prepared by the sol-gel method have a considerably large surface area in the range of 12.9–20 m^2.g^-1 when compared with 0.3 m^2.g^-1 for the conventional solid-state reaction of LaAlO3. The structural characteristics were examined by means of conventional techniques namely X-ray diffraction, infrared spectroscopy, thermogravimetry and differential thermal (TG-DTA) and specific surface SBET. Pore diameters and crystallite sizes are in the 8.8-11.28 nm and 25.4-30.5 nm ranges, respectively. The sol-gel method is a simple technique that has several advantages. In addition to that of not requiring high temperatures, it has the potential to synthesize many kinds of mixed oxides and obtain other materials homogeneous and large purities. It also allows formatting a variety of materials: very fine powders, fibers and films.

Keywords : aluminate, lanthan, perovskite, sol-gel
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