

*Title:* **Effect of doping on the electric properties of Nd<sub>2</sub>Zr<sub>2</sub>O<sub>7</sub>**

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Yttria-stabilized zirconia (YSZ) is a ceramic with crystalline cubic structure of zirconium dioxide stabilized with yttrium oxide at room temperature and is one of the best ionic conductors known today. Although YSZ presents some disadvantages that must be considered. One of these disadvantages is the difficulty to obtain stable zirconia ceramics. In addition, this electrolyte is a good conductor around 1000°C, which implies reducing or oxidizing atmospheres and therefore the stability of this ionic conductor is limited. Thus, compounds of similar characteristics are currently being studied to work at lower temperatures and to maintain the stability. The pyrochlore structure with general formula A<sub>2</sub>B<sub>2</sub>O<sub>7</sub> is a good idea to solve this problem.

In order to obtain compounds with pyrochlore structure with more number of vacants doping is used as a tool to increase the ionic conductivity. Increasing the vacants an increase of ionic conductivity is produced. In order to improve the electrical properties and found the cation more adequate to doping the position A and B are being studying.

This project is based on the preparation of Nd<sub>2</sub>Zr<sub>2-x</sub>Mg<sub>x</sub>O<sub>7-x</sub> x = 0.01; 0.02; 0.04 (NZO Mg x) ceramics with a soft chemical route known as sol-gel method. The sintered ceramics at 1500°C during 10h, shown by XRD that a single pyrochlore phase (NZO Mg 0.01) was obtained. Also, the peaks of NZO coincided with NZO Mg 0.01. This fact indicated that the doping in B position with magnesium had been realized successfully.

Impedance spectroscopy analysis showed that the resistance of the doped compound was lower than the compound without doping. Also, the NZO Mg 0.01 showed p-type electronic conduction because the conductivity was oxygen pressure dependent. An increase of oxygen pressure implied an increase of conductivity. This fact was justified by IS where a progressive disappearance of the spike was observed. Thus, finally was concluded that NZO Mg 0.01 was much more conductor than NZO.

**Keywords:** Pyrochlore, ceramics, ionic conduction, vacant, sol-gel, XRD, IS