o.m1.p13 **Impedance spectroscopy study of hydrothermal synthesized $BaTi_{1-X}Zr_XO_3$:Ni ceramics.** A. Outzourhit, M.A. El Idrissi raghni, M.L. Hafid, F. Bensamka. *Laboratoire des Sciences des Matériaux.Faculté des Sciences Semlalia, Université Cadi Ayyad, Marrakech, Maroc.*
Keywords: ferro-electricity, perovskites, impedance spectroscopy.

Perovskite-type ferroelectric materials have received considerable attention recently because of their growing use in electronic, electrooptic, optical and microwave devices[1]. It is well known that barium titanate and barium zirconate can mix intimately with no apparent phase segregation. $BaTi_{1-x}Zr_xO_3$ is potentially attractive as its curie point can be controlled by varying the mole fraction x of Zr.

Nickel-doped $BaTi_{1-x}Zr_xO_3$ powders have been prepared using the hydrothermal process starting from BaO, TiO_2, $ZrO_2.xH_2O$, and aqueous solutions of Ni^{3+}. The major advantage of this method is that the moderate temperature employed during this technique (140°C) and the inexpensive reactors used reduce the cost of the products. The obtained powders were cold compacted and sintered at 1280°C.

XRD analysis of the obtained powders showed the room-temperature stabilization of the cubic phase (pseudo-cubic phase). Surface tension effects have been invoked to explain this stabilization in fine grained barium titanate[2].

The study of dielectric properties showed that these ceramics had a ferroelectric behavior. This can likely be due to an eventual quadraticity gradient in the grains. Impedance spectroscopy results have been analyzed using the empiric cole-cole model. From cole-cole parameters and using the two-layer dielectric model [3], we were able to evaluate the electric properties of the grain boundary and bulk grain.

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o.m1.p14 **Crystal Structures and Raman Scattering of the Phases of $Li_2NH_4K(SO_4)_2$. A New Compound with Ferroelectric-Paraelectric Phase Transition.** J. Mata, X. Solans, T. Calvet & M. Font-Bardia. *Department of Crystallography, University of Barcelona. Spain.*
Keywords: ferro-electricity, NLO materials.

The interest $LiKSO_4$ of is due to its pyroelectric, superionic conductivity, ferroelastic and ferroelectric properties and the framework of corner-shared LiO_4 and SO_4 tetrahedra is relatively flexible, shown by the large number of phase transitions in the temperature range 10 to 950 K. $LiNH_4SO_4$ is pseudo isostructural to $LiKSO_4$ and the interest in this compound is derived from its ferroelastic and ferroelectric properties and the identification of several phase transitions in the temperature range 10 to 615K We have prepared the $Li_2NH_4K(SO_4)_2$ which undergoes a phase transition at 473 K. Crystal structure at room temperature was determined from single crystal X-ray diffraction. The phase transition at 473 K is the first order with large thermal hysteresis and it is of type destruction-growth, so the crystal structure at high temperature is not possible to be solved heating a single crystal X-ray diffraction, thereby it has been solved from powder data. Raman scattering was made in order to confirm the disorder model for K and NH_4 ions.

Crystal data.
298 K: Hexagonal, a = b = 18.2140(11), c = 8.6094(8) Å. Space group $P6_3$
483 K: Hexagonal, a = b = 10.5569(6), c = 8.7128(7) Å. Space group $P6_3/mmc$.