

## Vibrational spectroscopy and AFM piezoresponse study of Barium Titanate nanocrystalline ceramics

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### Abstract

Barium Titanate dense ceramics with grain sizes of 50nm, 100nm and  $\approx 1\mu\text{m}$  were investigated by IR and Raman technique in order to obtain information about the changes in the local order induced by the size effects. The dense nanocrystalline ceramics were obtained from ultrafine powders (30-40nm) prepared by a chemical aqueous method which were densified by Spark Plasma Sintering technique. The IR and Raman spectra in the range of temperatures of (80-700)K showed the presence of all the crystalline phases of BaTiO<sub>3</sub> single crystal, even in the finest structure, i.e. the ceramic with 50nm grain size, with characteristics due to grain size effects. The vibrational spectroscopy investigations and the AFM piezoresponse study incontestably proved the polar phases and ferroelectric activity at local scale in nanocrystalline Barium Titanate ceramics.