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4 Submissions

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#196	Phase transitions and structure-property relationships in BaCexTi1-xO3 ceramics	Accepted
#195	Engineered ferroelectric PVDF composites containing BaTiO3-based core-shell inclusions: dielectric properties and 3D FEM modelling of field distribution	Accepted
#128	Role of grain size on the structural and functional properties of (Ba,Ca)(Zr,Ti)O3 ceramics	Accepted

X

Accepted

Title

Ferroelectric-relaxor crossover of Ba-based perovskites by electric field and temperature dependent Raman spectroscopic investigations

Authors

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Abstract

Relaxor ferroelectrics (RF) are a special sub-class of ferroelectric ceramics that are attractive for their peculiar dielectric and electromechanical properties, including frequency dispersion of relative permittivity and colossal field-induced strains. Relaxor behaviour is observed only in chemically substituted materials that are featured by compositional disorder i.e. arrangement of different ions in the equivalent crystallographic sites of the parent matrix resulting in emergence of complex electric field interactions. In this work, the effect of heterovalent substitution (Nb^{5+}) in barium titanate (BT) is investigated. Niobium replaces Ti^{4+} at the perovskite B-site, this way introducing charge imbalances that are compensated by Ba vacancies. On the atomic scale, it is expected that such charge differences may induce relaxor behaviour above a certain concentration of Nb^{5+}. A composition-dependent Raman investigation of niobium modified BT (BNT) at varying electric field (E) and temperature (T) is performed to study the local structures of these highly disordered ceramics. The ferroelectric phase transitions, ferroelectric-relaxor crossover and nanoscale polar dynamics are explained using Raman results and are compared against the macroscopic dielectric and ferroelectric property measurements. The study is also supported by theoretical modelling of different Raman modes to explain the local chemical arrangement in BNT and thus correlate it with the macroscopic properties. Our study contributes to extend the usefulness of Raman spectroscopy to study highly disordered compounds like relaxors.

Topic Areas

○ Ferroelectrics

Image 1

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Image 2

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Image 3

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Submission Format

Oral

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Decision

Oral

*Attendance confirmed by **Vignaswaran K. Veerapandiyan** on Tuesday, 17th of April 2018.*

Decision Locked

Review Summary

Chair Comments

No comments provided.