

## Phase formation and dielectric properties of pentavalent cation doped non-stoichiometric Bismuth Zinc Niobate (BZN) cubic pyrochlore.

### Abstract

In an attempt to synthesize new solid solutions and search for better performance materials, pentavalent cation dopants were introduced into the non stoichiometric BZN cubic pyrochlore,  $\text{Bi}_3\text{Zn}_{1.84}\text{Nb}_3\text{O}_{13.84}$ . Extensive solid solutions were formed in  $\text{Bi}_3\text{Zn}_{1.84}\text{Nb}_3\text{-xD}_x\text{O}_{13.84}$  with limit at  $x = 3$  and  $2.6$  for  $D = \text{Ta}$  and  $\text{Sb}$ , respectively. This illustrates the possibility of cationexchange solid solutions due to similarity in dopants' ionic radii. The elemental analysis confirmed the stoichiometry of doped materials with no deleterious  $\text{Bi}_2\text{O}_3$  loss. Ta / Sb doped samples were highly resistive with activation energies ranging from  $1.2 - 1.9$  eV. Temperature coefficient of capacitance, TCC, decreased from  $-396$  ppm / oC to  $\sim -180$  ppm / oC and  $\sim -90$  ppm / oC for both end members, respectively.

**Keyword:** Pyrochlore; Solid solutions; Electroceramics; Chemical doping.