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Structure–property Relationships of Perovskite-structured  $\text{Ca}_{0.61}\text{Nd}_{0.26}\text{Ti}_{1-x}(\text{Cr}_{0.5}\text{Nb}_{0.5})_x\text{O}_3$  Ceramics

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## Structure–property Relationships of Perovskite-structured

### $\text{Ca}_{0.61}\text{Nd}_{0.26}\text{Ti}_{1-x}(\text{Cr}_{0.5}\text{Nb}_{0.5})_x\text{O}_3$ Ceramics

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#### Abstract:

A series of  $\text{Ca}_{0.61}\text{Nd}_{0.26}\text{Ti}_{1-x}(\text{Cr}_{0.5}\text{Nb}_{0.5})_x\text{O}_3$  (CNTCN $x$ ) ( $0 \leq x \leq 0.1$ ) ceramics were prepared via a solid state reaction method. All CNTCN $x$  samples were crystallized into the orthorhombic perovskite structure. The SEM micrographs indicated that the average grain sizes of samples depended on  $(\text{Cr}_{0.5}\text{Nb}_{0.5})^{4+}$  concentration. And as  $(\text{Cr}_{0.5}\text{Nb}_{0.5})^{4+}$  concentration increased, the average grain size of samples decreased significantly. The short range order (SRO) structure and structural distortion of oxygen octahedra proved to exist in CNTCN $x$  crystals from Raman spectra analysis results. The microwave dielectric properties highly depended on the B-site bond strength, oxygen octahedra distortion, reduction of  $\text{Ti}^{4+}$  to  $\text{Ti}^{3+}$  and internal strain  $\eta$ . At last, the CNTCN0.06 ceramic sintered at 1400 °C for 4h exhibited good and stable comprehensive microwave dielectric properties of  $\epsilon_r=92.3$ ,  $Q \times f=13,889$  GHz,  $\tau_f=+152.8$  ppm/°C.

**Key words:** Microwave dielectric ceramics, Substitution, Crystal structure

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