

# Crystallization and Dielectric Properties of Nd<sup>3+</sup> Doped Ferroelectric Glass-Ceramics in the Na<sub>2</sub>O-BaO-Nb<sub>2</sub>O<sub>5</sub>-SiO<sub>2</sub> System

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Ferroelectric glass-ceramics of the Na<sub>2</sub>O-BaO-Nb<sub>2</sub>O<sub>5</sub>-SiO<sub>2</sub> system were obtained from controlled crystallization process performed on the parent glass of composition 20Na<sub>2</sub>O-10BaO-30Nb<sub>2</sub>O<sub>5</sub>-40SiO<sub>2</sub>. Nd<sub>2</sub>O<sub>3</sub> doping content was varied in the range 0, 0.1 and 0.5 mol%. The glass samples were prepared via a conventional melting method at 1500 °C in the platinum crucible for 2 hr following by splashed-quenching on the stainless steel plate. Thermal properties of the as-quenched sample were studied by DTA/TG technique and the results showed the possible crystallization peak at 740 °C and this was selected as the treatment temperature. Heat treatment process was employed for production of glass-ceramic which is performed in the electrical furnace at selected temperature. The obtained glass-ceramic specimens were investigated in terms of the crystalline phase formation, volume fraction, bulk density and dielectric properties. The results of phase identification using XRD revealed that NaNbO<sub>3</sub> and Ba<sub>2</sub>NaNb<sub>5</sub>O<sub>15</sub> were the dominant crystalline phases for all doped samples. The volume fractions of the crystallites are noticeably increased with the Nd<sub>2</sub>O<sub>3</sub> content. Bulk densities of the glass-ceramic samples are higher than that of the related as-quenched glass. The dielectric constants measured at room temperature at various frequencies for doped glass-ceramics seemed to be affected by the presence of Nd<sup>3+</sup> ion.

**Primary authors:** Dr NIYOMPAN, Anusorn (Advanced Ceramics Laboratory, Ubon Ratchathani University, Ubon Ratchathani, THAILAND 34190); Mr BOONSONG, Paitoon (Advanced Ceramics Laboratory, Ubon Ratchathani University, Ubon Ratchathani, THAILAND 34190)

**Co-author:** Dr TIPAKONTITIKUL, Rungnapa (Advanced Ceramics Laboratory, Ubon Ratchathani University, Ubon Ratchathani, THAILAND 34190)

**Presenter:** Mr BOONSONG, Paitoon (Advanced Ceramics Laboratory, Ubon Ratchathani University, Ubon Ratchathani, THAILAND 34190)

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