

Structural and electrical properties of Nb-substituted LiTa_{1-x}Nb_xO₃

ABSTRACT

Single phase LiTa_{1-x}Nb_xO₃ solid solution with 0.00 ≤ x ≤ 1.00 was successfully synthesised via conventional solid-state method at 950°C for 24 h. These materials were refined and fully indexed with hexagonal crystal system, space group of R3c; lattice parameters, a ranging from 5.1410(6) to 5.1471(3) and c ranging from 13.7467(1) to 13.8341(1) ; with α = 90° and β = 120°. Variation of the lattice parameters in these materials was found to be negligibly small throughout the subsolidus solution. No thermal event was detected within the studied temperature range of 50 to 1000°C. The electrical properties of samples were characterised by AC impedance analyser, HP4192A at temperature ranging from room temperature to 850°C over a frequency range of 5 Hz to 13 MHz. LiTa_{1-x}Nb_xO₃ materials exhibited bulk response with associated capacitances in the order of 10-12 F cm⁻¹ and the temperature-dependent conductivities were found to increase with increasing temperatures. The results showed that LiTa_{1-x}Nb_xO₃ samples were of typical ferroelectrics.

Keyword: Ferroelectric; Impedance; Solid solution; Solid-state method