
Article:
Zhu, FY, Ward, MB, Li, JF et al. (1 more author) (2015) Core-shell Grain Structures and Dielectric Properties of Na0.5K0.5NbO3-LiTaO3-BiScO3 Piezoelectric Ceramics. Acta Materialia, 90. 204 - 212. ISSN 1359-6454

https://doi.org/10.1016/j.actamat.2015.02.034

Compositional Formulation	Abbreviations	Symbol of composition in Fig. 1
0.98[0.99($Na_{0.5}K_{0.5}NbO_3$)-0.01($LiTaO_3$)] – 0.02[$BiScO_3$]	NKN-1LT-2BS	---
0.98[0.98($Na_{0.5}K_{0.5}NbO_3$)-0.02($LiTaO_3$)] – 0.02[$BiScO_3$]	NKN-2LT-2BS	---
0.98[0.96($Na_{0.5}K_{0.5}NbO_3$)-0.04($LiTaO_3$)] – 0.02[$BiScO_3$]	NKN-4LT-2BS	**A**
0.98[0.95($Na_{0.5}K_{0.5}NbO_3$)-0.05($LiTaO_3$)] – 0.02[$BiScO_3$]	NKN-5LT-2BS	**B**
0.98[0.94($Na_{0.5}K_{0.5}NbO_3$)-0.06($LiTaO_3$)] – 0.02[$BiScO_3$]	NKN-6LT-2BS (Standard)	**C**
0.98[0.94($Na_{0.5}K_{0.5}NbO_3$)-0.06($LiTaO_3$)] – 0.02[$BiScO_3$] with 3 wt% excess alkali carbonates as starting powder	Excess NKN-6LT-2BS	**D**

Table. 1 Solid solution target compositions as plotted in **Fig.1** and their abbreviations.

Abbr.		NKN-4LT-2BS	NKN-5LT-2BS		NKN-6LT-2BS		
Nominal Formula		$(Li)\ (Na_{0.240}K_{0.240})(Ta_{0.020}Nb_{0.480})O_3 - (Bi_{0.010}Sc_{0.010})O_3$	$(Li)\ (Na_{0.239}K_{0.239})(Ta_{0.025}Nb_{0.477})O_3 - (Bi_{0.010}Sc_{0.010})O_3$		$(Li)\ (Na_{0.237}K_{0.237})(Ta_{0.030}Nb_{0.475})O_3 - (Bi_{0.010}Sc_{0.010})O_3$		
Local Region			**Core**	**Shell**	**Core**	**Shell 1**	**Shell 2**
Element	**Na**	**27.8**	**28.7**	**27.8**	**26.1**	**23.1**	**25**
	K	**21.3**	**21.8**	**20.9**	**20.3**	**22.3**	**19.6**
	Ta	**3.1**	**1.4**	**4.1**	**1.6**	**4.4**	**4.9**
	Bi	**1.3**	**0.4**	**1.8**	**0.4**	**0.8**	**1.4**
	Sc	**0.7**	**0.3**	**1.0**	**0.2**	**0.7**	**1.2**
	Nb	**45.8**	**47.4**	**44.4**	**51.3**	**48.6**	**47.9**
Calculated Formula*		$(Li)\ (Na_{0.278}K_{0.213})(Ta_{0.031}Nb_{0.4581})O_3 - (Bi_{0.013}Sc_{0.007})O_3$	**Core:** $(Li)\ (Na_{0.287}K_{0.218})(Ta_{0.014}Nb_{0.474})O_3 - (Bi_{0.004}Sc_{0.003})O_3$ **Shell:** $(Li)\ (Na_{0.278}K_{0.209})(Ta_{0.041}Nb_{0.444})O_3 - (Bi_{0.018}Sc_{0.010})O_3$		**Core:** $(Li)\ (Na_{0.261}K_{0.203})(Ta_{0.016}Nb_{0.513})O_3 - (Bi_{0.004}Sc_{0.002})O_3$ **Shell 1:** $(Li)\ (Na_{0.231}K_{0.223})(Ta_{0.044}Nb_{0.486})O_3 - (Bi_{0.008}Sc_{0.007})O_3$ **Shell 2:** $(Li)(\ Na_{0.250}K_{0.196})(Ta_{0.049}Nb_{0.479})O_3 - (Bi_{0.014}Sc_{0.012})O_3$		

Table. 2 TEM-EDX data (atomic%) for NKN-xLT-2BS specimens, x= 4-6 mol%. The nominal target chemical formula of the solid solution (upper row) and formula calculated from EDX data (lower row) are presented. (Note: Licould not be detected by the EDX technique).