

MS35-P5 Panoramic phase diagrams of BiFeO₃ – based solid solutions Payel Teslenko,^a Alexander Nazarenko^a, Larisa Reznichenko^b, Yuri Kabirov^a, Michael Kupriyanov^a,^a*Department of Physics, Southern Federal University, SFEDU, Rostov-on-Don (Russia)*, ^b*Institute of Physics, Southern Federal University, SFEDU, Rostov-on-Don (Russia)*.
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In solid solutions of BiFeO₃ multiferroic and second components such as BiMnO₃ multiferroic, KNbO₃ ferroelectric or NaNbO₃ antiferroelectric the different order parameter interactions should occur: magnetic, ferro(-antiferro)electric, and of ferroelastic nature. X-ray diffraction study in 20 ≤ T ≤ 800 °V temperature range of (1-x)BiFeO₃-(x)BiMnO₃ (BFMO), (1-x)BiFeO₃-(x)KNbO₃ (BFKNO) and (1-x)BiFeO₃-(x)NaNbO₃ (BFNNO) solid solutions systems' samples has allowed to make the (x,T) phase diagrams of the systems. It was established that in BFMO system the phase boundaries of R3c, Pbnm and Pm3m phases lessen in transition temperature with the increase of (x); in BFKNO system the R3c, Pbnm, Pm3m phases' boundaries of pure BiFeO₃ with KNbO₃ doping lessen in transition temperature with the increase of (x) as well. The transition temperatures between Amm2, P4mm and Pm3m phases of pure KNbO₃ are also decreased with the decrease of (x). The phase boundaries in BFNNO system's solid solutions shift in a similar way. The comparison of BFKNO and BFNNO phase boundaries shows that in these systems the ferroelectric phase transitions' temperatures of BiFeO₃, KNbO₃ and NaNbO₃ decrease with the increase of secondary component's content. This is also proved by preliminary results of permittivity-temperature dependencies investigations in the two latter systems.

Keywords: Ferroic, Ferroelectricity, X-ray

MS35-P6 Lead-free piezoelectric composites produced by 3D additive manufacturing. David I. Woodward,^a Pam A. Thomas,^a Simon J Leigh,^b Duncan R. Billson^b ^a*Department of Physics, University of Warwick, UK*, ^b*School of Engineering, University of Warwick, UK*,
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0-3 piezocomposites are formed by embedding piezoelectric oxide particles in a polymer matrix [1]. Devices produced using this method offer certain advantages over sintered devices, in particular: lower manufacturing costs, greater capability for device geometry and less material wastage. 0-3 piezocomposites have lower piezoelectric coefficients than the corresponding ceramics, however, in this study, we have used the recently discovered material Ba_{0.85}Ca_{0.15}Ti_{0.9}Zr_{0.1}O₃ as the piezoelectric component. This has a *d*₃₃ (longitudinal piezoelectric coefficient) of ~ 600 pC/N, around twice that of the next best lead-free material [2].

In this work, we have used an additive manufacturing technique to produce 0-3 piezocomposites and examined the effect of several variables on the *d*₃₃ of the resultant composite. It was found that the *d*₃₃ increased with increasing oxide content and that higher proportions of cross-linker in the matrix phase caused the *d*₃₃ to fall more quickly after poling.

The effects of oxide particle size and choice of matrix monomer are also shown.

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