## Temperature-composition Phase Diagram of PZN-PT Studied by High Resolution Neutron Powder Diffraction

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Lead zinc niobate – lead titanate (PZN-PT) has exceptional piezoelectric properties. Until five years ago, the pseudo-binary lead zirconate – lead titanate (PZT) and PZN-PT phase diagrams had many features in common. In particular, both had a morphotropic phase boundary between a rhombohedral (R3m) and tetragonal (P4mm) phase, bounded above by a cubic phase (Pm3m). The piezoelectric properties of both are optimal close to the morphotropic phase boundary. More recently, there have been major changes to the PZT phase diagram with the reporting of a large monoclinic (Cm) phase field adjacent to the morphotropic boundary and conflicting reports of low temperature modifications to the structures. Whether PZN-PT has similar structural modifications has not been addressed adequately in the literature.

This study presents the results of a very high resolution neutron powder diffraction study of the temperature-composition phase diagram of PZN-PT using the technologically interesting compositions PZN, PZN-4.5%PT and PZN-8%PT. Samples were crushed flux-grown single crystals and were studied at temperature intervals of 5-15K between 4.2 and 450K. Details of the temperature and composition induced phase transitions in PZN-PT will be presented.

Keywords: ferroelectrics, phase transitions, perovskites