



SEMINAR

Lead free, Polar Functional Materials and their Structural and Properties Characterization

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12 noon – 1 pm
Science Lecture Theatre S9, Building 25

Abstract

$\text{Pb}(\text{Zr}_{1-x}\text{Ti}_x)\text{O}_3$ (PZT) is currently by far the most important piezoelectric material and widely used in transducers, sensors and actuators for an enormous variety of applications ranging from smart car shock absorbers to piezo-igniters to pressure sensors. The down side of PZT's and other Pb-containing compounds, however, is their inherent toxicity. As a result, Europe, Japan and the US are all seeking to reduce, if not eradicate, Pb from all electronic devices. To date, PZT has been excluded from these directives as there are no proven acceptable lead free replacement materials available.

In this talk, the crystal chemistry underlying polar behaviour and its uses will be discussed in the context of two particular promising lead free piezoelectric systems, the $\text{K}_{1-x}\text{Na}_x\text{NbO}_3$ (KNN) and $(1-x)\text{Na}_{1/2}\text{Bi}_{1/2}\text{TiO}_3 \cdot x\text{BaTiO}_3$ (NBT-BT) systems. Both these systems are inherently strongly polymorphic and undergo a series of displacive structural phase transitions on heating and cooling associated with the progressive ordering of the off-centre displacements responsible for their ferroelectricity and piezoelectric response behaviour. The crystallography underlying these various phase transitions and its relationship to their properties will also be discussed.

Convenor: Associate Professor Joanne Etheridge
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Visitors are most welcome: Please note that there is a designated Visitors Car Park (N1) clearly ground-marked by white paint and tickets, at a cost of \$1.4/hour for up to 3 hours, available from a dispensing machine. This high-rise carpark is located on the following Clayton Campus Map, Ref. B2.

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