





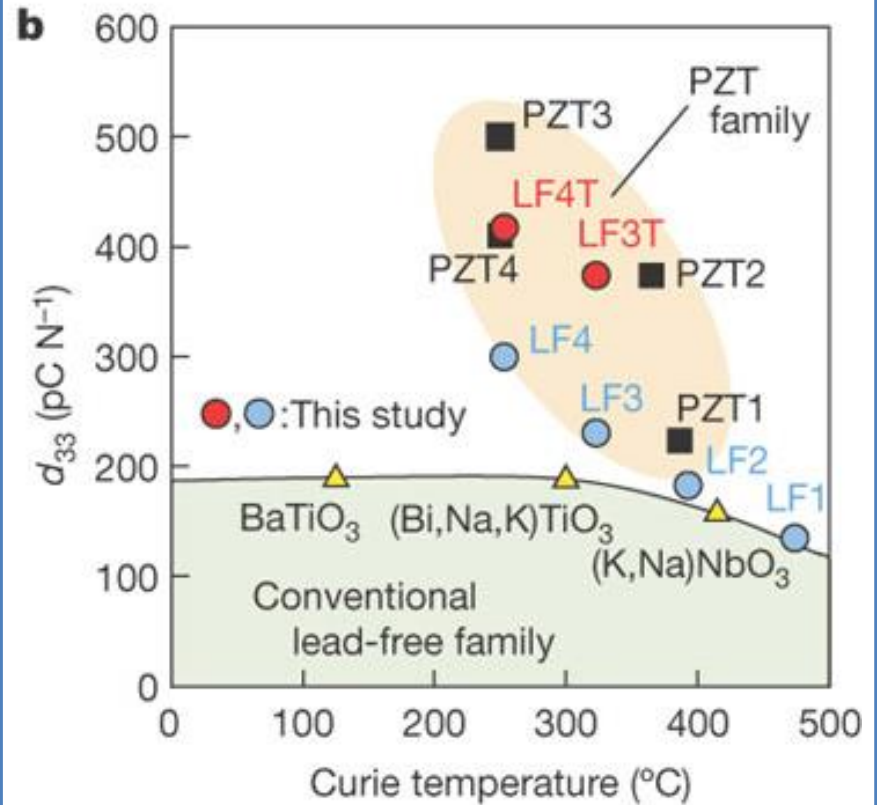
● Environmental problems



<p>WEEE (2002/96/EC)</p> 	<p>RoHS (2002/95/EC)</p> 
<p>All product shall be Information & labelling. Put right side mark in product before Aug. 2005.</p>	<p>RoHS substance ban commences from July 2006</p>
<p>BTC, from May 2005, puts WEEE information & logo in manual and FCC label of all products.</p>	<p>BTC, from March 2006, puts RoHS compliant logo on carton and gift box of RoHS compliant products.</p>
	

- May cause harm to the unborn child
- Possible risk of impaired fertility
- Harmful by inhalation and if swallowed
- Danger of cumulative effects.
- Very toxic to aquatic organism, may cause long-term adverse effects in the aquatic environment.

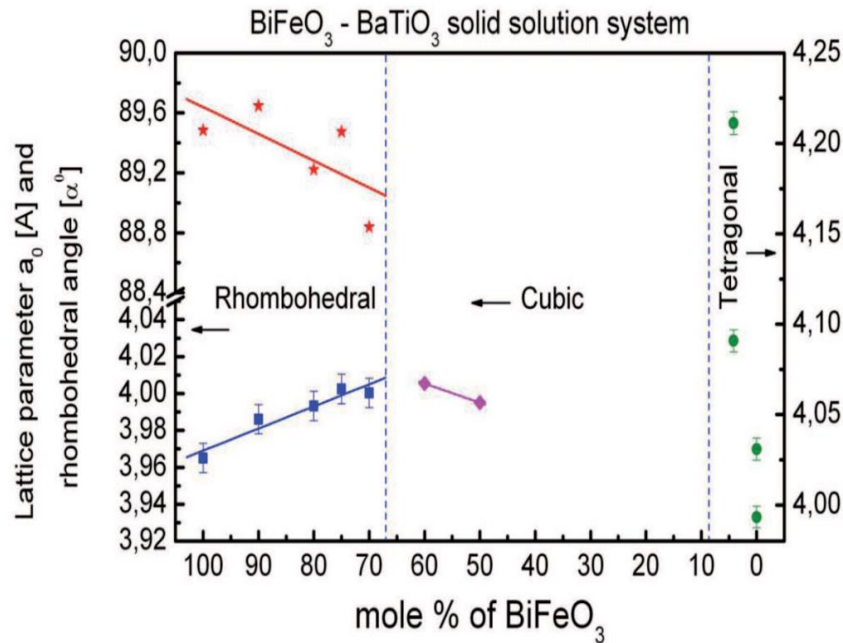
Lead vs Lead-free



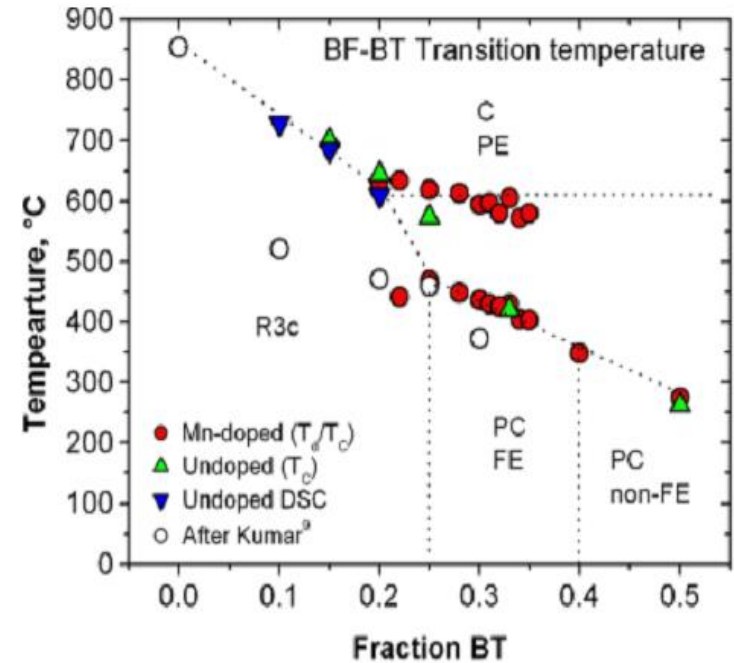
Y. Saito *et al.*, Nature., **432**, 84 (2004)

Find a new lead-free piezoelectric materials for replacement of lead-based piezoelectric materials

BiFeO₃-BaTiO₃ lead-free system has a two different phase diagram. The phase diagram is not decided in BiFeO₃-BaTiO₃ system



M. M. Kumar *et al.* JAP **75**, 4 (1999)



Leontsev and Eitel. J. Am. Ceram. Soc. **92**, 2957 (2009).



The new 3D phase diagram of BiFeO₃-BaTiO₃ system will be made with temperature-, composition-, and electric field-dependence