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Lead-Free Piezoelectric Compounds for Environmentally Friendly Applications

Piezoelectric actuators and sensors have a wide range of applications from smaller applications such as medical ultrasound to large scale arrays, as used in sonar by the Navy. Presently, the ceramics with the best piezoelectric properties contain lead; however, growing concerns about the negative environmental impact lead presents has led to a significant need for research to find suitable and environmentally friendly replacements for the currently used ceramics. One area of research, and our current research focus, is on $(\text{Bi}_{1/2}\text{Na}_{1/2}\text{O}_3)_{0.925}(\text{BaTiO}_3)_{0.075}$ doped with Manganese (Mn) which in amounts up to 2% increases the depolarization temperature, above which the piezoelectric property is lost.