

**New flexure Mode Flexoelectric Piezoelectric
Composite**

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Barium Strontium Titanate ($\text{Ba}_{0.67}\text{Sr}_{0.33}\text{TiO}_3$) is a perovskite structure ferroelectric solid solution which is in the paraelectric phase at room temperature and also has exceptionally high flexoelectric μ_{11} and μ_{12} constants some 10^7 times larger than equivalent constants in single low permittivity dielectrics. These high values make possible a range of interesting piezoelectric composites by exploiting texture symmetry at a suitable scale to produce high driving gradients in elastic or electric fields. Here-to fore the focus has been upon pyramid or cone type structures to exploit longitudinal gradients in S_{11} or E_1 . Now our interest is in a new flexure mode design (1) (2) to exploit the large μ_{12} values. Initial results indicate very sharp low frequency resonances (below 300 Hz) leading to apparent $d_{33} > 2000$ pC/N, and as would be expected for parallel plate electrode geometry no electric field gradients and no evidence of converse piezoelectric effect. Multilayer structures are now under study to see if broad band multi-resonant pickup can be achieved and also whether an applied static stress bias will induce a measurable converse effect.

1. N. D. Smith, John Y. Fu, Wenyi Zhu, Nan Li, L. Eric Cross, AMF-6, Taipei Taiwan, August 2-6, 2008, "Progress Towards Strong Flexoelectric Piezoelectric Composites."

2. L. Eric Cross, John Y. Fu, Wenyi Zhu, Nan Li, "Flexoelectric composites on alternative approach for generating strong lead free piezoelectric" Symposium DZ. Electroceramics XI, University of Manchester U.K. August 31, 2008.