

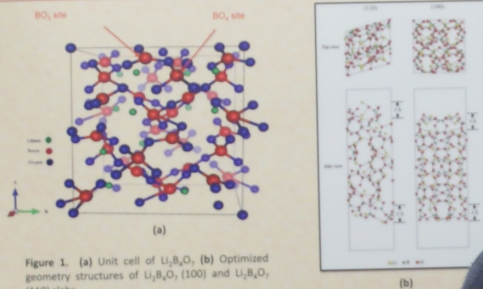


Organic - inorganic Interfacing Towards Better Pyroelectric Devices

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Our Pyroelectric Model System: The Surface of $\text{Li}_2\text{B}_4\text{O}_7$ Surface-scientific investigation



NEXAFS studies of Mn-doped $\text{Li}_2\text{B}_4\text{O}_7$ show that Mn dopants occupy both BO_4 sites in Mn^{2+} and Mn^{3+} with very few dopants in interstitial Lithium sites

The Surface Pyroelectric Effect in $\text{Li}_2\text{B}_4\text{O}_7$

Studies about explicit dependence of surface states and pyroelectric effects in lithium tetraborate are rare. Our work is not only an effort to remedy this deficiency but an effort to exploit the surface to make better devices.

Figure 2. (a) Pyroelectric current for $\text{Li}_2\text{B}_4\text{O}_7$ single crystal along (110) direction; (b) Temperature dependence of pyroelectric coefficient along (110) direction; (c) temperature dependence of elastic stiffness constant along the polar c-axis (solid line) and the (001) pyroelectric coefficient (dashed line).

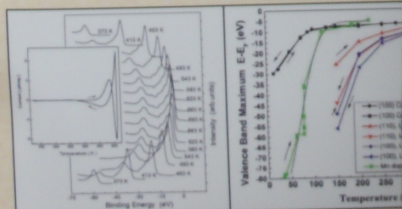


Figure 3. (a) Photoemission spectra from $\text{Li}_2\text{B}_4\text{O}_7$ (110) surface for a succession of heating-cooling cycle. (b) Photovoltaic charging as measured from the valence band.

INTRODUCTION

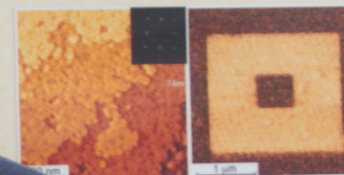
We investigate two pyroelectric properties of pyroelectric materials. We observe surface states using photoemission spectroscopy and increase in piezoelectric response using Piezo-Force Response Microscopy.

Device Characterization



Ultra-Thin Films of BaTiO_3 : A Second Model System for Surface Pyroelectric Effect:

Surface-scientific investigation



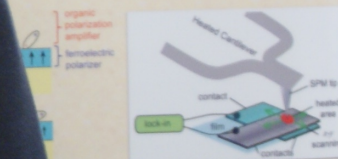
Thin BaTiO_3 films were studied under UHV using STM, PFM, electron diffraction and photoemission. The films are atomically flat terminated with TiO polarizable with PFM

Chen, Enders, et al.
New J. Phys.
2011, 13, 083001

Probing the Interface Polarization with Dipolar Molecules

the surfaces of BaTiO_3 films with dipolar molecules. The temperature dependence of surface polarization

Approach: The tip of an atomic force microscope is used as an electrode to detect and manipulate the polarization of pyroelectric thin films



Dipolar Molecules-BTO Interface



under ultrahigh vacuum, but vanishes with time.



enhance the surface polarization but reduce the