

## **Fabrication and applications of lithium niobate micro/nano structures**

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Nonlinear optical frequency conversion is reported from single crystal lithium niobate nanostructures. Structuring on the nanometer scale is achieved by a combination of ferroelectric domain inversion and chemical etching. A 2D hexagonal lattice of inverted ferroelectric domains is formed after selective application of an external electric field at room temperature. Long (15 hr) etching in hot (60°) HF acid results in differential etching of opposite ferroelectric domain faces while side etching sharpens the end point of the superstructures. The end structure terminates in pyramidal shaped tips of sub-wavelength dimensions and ultra sharp edges. A scanning electron microscopy (SEM) image of a tip array is shown in the attached figure. A High resolution side view of the sharp tip is shown in the inset picture.

We have observed highly efficient nonlinear optical second harmonic generation (SHG) from single tips. The efficiency of SHG is two orders of magnitude higher as compared to that of the unstructured crystal.

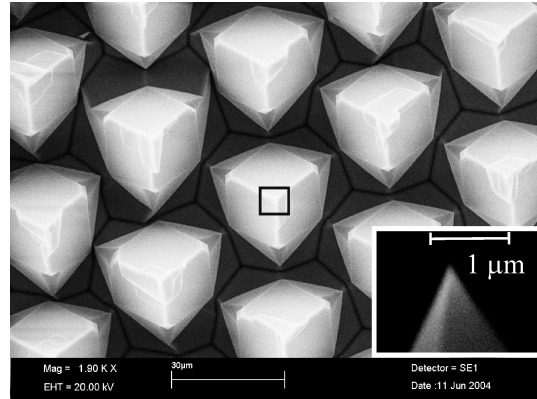


Figure: SEM image showing an array of microstructured pyramidal superstructures. The inset photo shows a high magnification side image of the tip.

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