

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Solid helium nanometer inclusions in LiNbO₃ AVISHAI OFAN, Columbia University, LIHUA ZHANG, Brookhaven National Laboratory, OPHIR GAATHON, Columbia University, SASHA BAKHRU, HASSARAM BAKHRU, SUNY Albany, DAVID WELCH, YIMEI ZHU, Brookhaven National Laboratory, RICHARD M. OSGOOD JR., Columbia University — He implantation is a reoccurring technique in a variety of fabrication strategies for microelectronic and optical devices. Because of its extremely low solubility in crystals, impurity He atoms are known to nucleate and accumulate as bubbles in metals which can result in the build up of extremely high pressures near the crystal's theoretical shear strength. It is of interest to extend the understanding of the atomic-scale He inclusions in complex oxides, which offer a wide variation in mechanical and unusual ionic and dielectric properties. We show, using high-resolution-TEM of He-implanted LiNbO₃, that He inclusions in LiNbO₃ hold extremely high pressure, and are probably at solid phase. In addition, the energetically favored shape of the inclusions is spherical and not oblate as predicted by elastic theory. When annealed, the spherical He bubbles migrate and accumulate into a nonoblate thick bubble due to preferred pyramidal-twinning-system orientation.

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Date submitted: 20 Nov 2009

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