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Epitaxial thin films of the superconducting spinel oxide $LiTi_2O_4$
RAJESH CHOPDEKAR, Applied Physics, Cornell University, YURI SUZUKI, Materials Science, UC Berkeley — Lithium titanate is the only superconducting spinel oxide documented in literature. Related oxide spinels[1] such as the heavy fermion system LiV_2O_4 and charge-ordered $LiMn_2O_4$ indicate that electron correlations are strong in these systems. We have fabricated epitaxial films of $LiTi_2O_4$ on $MgAl_2O_4$ and MgO single crystalline substrates to explore such behavior in thin film form. Atomic force microscopy indicates <1nm RMS surface roughness, and 2- and 4-circle x-ray diffraction confirms film epitaxy. Films on $MgAl_2O_4$ have a critical temperature T_c of up to 11.3K with a resistivity transition width of 0.25K, while films on MgO have lower T_c with broader transitions. Magnetization vs. magnetic field of a zero-field cooled sample shows Meissner shielding consistent with Type II superconductors. Such films can be used in spin-polarization measurements of complex oxide half-metallic thin films, as well as fundamental studies of the effect of epitaxial strain, microstructure, and cation disorder/substitution on the superconducting properties of $LiTi_2O_4$. [1] M. Lauer et al, Phys Rev B 69, 075117 (2004).

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