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Magnetoresistance, Hall effect, and Point Contact Tunneling Spectroscopy of Superconducting $LiTi_2O_4$ Thin Films[1] X.H. ZHANG, R. SUCHOSKI, S. MARUYAMA, S. YASUI, J.M. SHIN, Y.P. JIANG, R.L. GREENE, I. TAKEUCHI, Center for Nanophysics and Advanced Materials, University of Maryland, G. HE, L. SHAN, K. JIN, Institute of Physics, Chinese Academy of Sciences — Superconducting $LiTi_2O_4$ thin films with a transition temperature of 11 K have been epitaxially fabricated on $MgAl_2O_4$ substrates using pulsed laser deposition (PLD). Systematic studies of the transport properties and the tunneling spectroscopy of the films (t $\sim$ 180nm) have been performed. In the normal state, the Hall coefficient shows a nearly constant value with a positive sign over a broad temperature range, suggesting a single-band hole-like electronic transport. The magnetoresistance of the material shows an unexpected change in the sign at 50 K. Below this temperature, the resistance shows a conventional parabolic increase with field. However, above this temperature, an unusual negative magnetoresistance appears. In the superconducting state, an upper critical field of about 18 Tesla is found by both magnetotransport and point-contact tunneling spectroscopy (PCS). In addition, our PCS results suggest that the superconducting gap in $LiTi_2O_4$ is BCS-like. A possible cause of the unusual negative magnetoresistance will be discussed. Preliminary results on the field effect using ionic liquid gating will also be presented.

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