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Growth and **Optical Properties of Multiferroic** LuFe2O4 Thin Films R.C. RAI, A. DELMONT, A. SPROW, Department of Physics, SUNY College at Buffalo, NY 14222, B. CAI, M. NAKARMI, Department of Physics, Brooklyn College and Graduate Center of the CUNY, Brooklyn, NY 11210 — We present surface, structural, electronic, and optical properties of multiferroic LuFe₂O₄ thin films grown on single crystal (0001) sapphire, (111) YSZ, and (001) LiNbO₃ substrates using electron-beam deposition. LFO thin films have been deposited on substrates at temperature 750 °C in an oxygen environment and post-deposition annealed at temperatures ranging from 600 to 800 °C to improve the stoichiometry and the crystal quality. We have used AFM and XRD for surface and structural characterization of the LFO thin films. To investigate the charge order phenomenon and the electronic properties, we carried out variable temperature (78 - 450)K) optical and resistivity measurements on the LFO thin films. The absorption spectra of LFO thin films show strong electronic excitations with the energy gap of ~ 2.18 eV at 300 K. Further, the energy gap of LFO displays strong temperature dependence, exhibiting a ferrimagnetic transition at ~ 240 K and a charge-order transition at ~ 350 K, respectively. We will also discuss the electronic excitations of the LFO thin film in the energy range 0.5 - 5.0 eV and their correlations with different magnetic and charge-ordered states.



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