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Optical and Electro-Optical Properties of RFe_2O_4 ($\text{R} = \text{Y}$ and Yb) Thin Films¹ RAM RAI, MICHELLE PASCOLINI, JOSHUA HINZ, SUNY Buffalo State — We present optical, and electro-optical properties of RFe_2O_4 ($\text{R} = \text{Y}$ and Yb) thin films deposited on sapphire and YSZ substrates by reactive electron-beam deposition. In order to investigate the electronic transitions and optical properties, we measured transmittance and reflectance of the RFe_2O_4 thin films in the 1 – 6 eV photon energy range and at temperatures from 10 to 400 K. The optical spectra of RFe_2O_4 show several electronic peaks arising from Fe^{2+} *d* to *d*-on-site and O 2*p* to Fe 3*d*, Y 4*d* and Y 5*s* (Yb 5*d* and 6*s*) charge-transfer transitions. Interestingly, the electronic excitations display strong temperature dependence with an anomaly between 170 K and 190 K, indicating a structural distortion. Moreover, the electro-optical effects up to 10 % have been observed in the RFe_2O_4 thin films at 10 K for applied electric fields below 1 kV/cm. These electro-optical effects mostly occur between the photon energy of 1 and 3 eV, vary almost linearly with applied fields, and the effects disappear above 150 K. We will discuss the driving mechanism for the observed electro-optical effects of these compounds.

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