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Optical Properties and Electronic Transitions of $YbFe_2O_4$ Thin Films[1] JOSH HINZ, MICHELLE PASCOLINI, RAM RAI, Physics Department, SUNY Buffalo State, 1300 Elmwood Ave., Buffalo, NY 14222 — We present growth, structural, optical and electronic properties of Ytterbium-Iron-oxide, $YbFe_2O_4$, thin films. $YbFe_2O_4$ exhibits the unique physical properties due to the presence of Fe^{2+} and Fe^{3+} valance states within the triangular lattice structure. We prepared the compound by a solid state reaction starting with stoichiometric proportion of Yb_2O_3, Fe_2O_3, and FeO. The material was then deposited on c-axis sapphire substrates using a reactive electron beam deposition technique to produce ˜100 nm thick films. Absorption, reflectance, and transmittance of the $YbFe_2O_4$ films were measured in the temperature range of 10 – 450 K. The optical spectra contain Fe d to d on-site transitions as well as O 2p to Fe 3d, Yb 6s, and Yb 5d charge-transfer transitions. In addition, the optical spectra exhibit strong temperature dependence, indicating evidence of a structural distortion of the crystal structure at ˜180 10 K as well as a magnetic transition at ∼250 K. The detail analysis of the optical data in comparison with theoretical studies will be presented.

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