Optical Properties and Electronic Structures of NiFe$_2$O$_4$ and CoFe$_2$O$_4$ Thin Films

R.C. RA$^1$, S. WILSER, M. GUMINIACK, Department of Physics, Buffalo State College, Buffalo, NY 14222, M.L. NAKARMII, Department of Physics, CUNY, Brooklyn, NY 11210, BUFFALO STATE COLLEGE TEAM, CUNY, BROOKLYN TEAM — We present the growth and investigation of inverse spinel ferrite NiFe$_2$O$_4$ and CoFe$_2$O$_4$ thin films. An electron beam deposition system was used to prepare ferrite thin films in the oxygen environment on sapphire and STO single crystal substrates. We measured a variable temperature (80 - 500 K) transmittance of these films to investigate their optical and electronic structures. The optical spectra of thin film samples show insulating characters with several electronic transitions, such as on-site metal $d$ to $d$ and charge transfer oxygen $2p$ to metal $3d$ transitions. Electronic transitions have been assigned based on the first principles calculations and comparison with chemically similar Ni and Co-containing compounds.

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