# Optical probe of correlations in rare-earth nickelates films

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We used infrared reflectometry and spectroscopic ellipsometry in the visible range to investigate electronic properties of rare-earth nickelate films. We study the temperature dependence of the optical conductivity as the composition (rare earth substitution) and strain (lattice mismatch with the substrate) varies close to the charge and magnetic ordering temperatures. The optical spectra show the appearance of a characteristic two-peak structure at 0.6 and 1.3 eV when the material passes from the metal to the insulator phase. Dynamical mean-field theory allows us to associate these spectral changes with a combined effect of bond disproportionation and Mott physics. Moreover, the spectral weight in these two prominent peaks significantly increases when the material passes from paramagnetic to antiferromagnetic state. This observation, very well captured by a Landau model with coupled charge and magnetism order parameters, indicates that charge order is a necessary condition to the emergence of a long range magnetic order. Through a positive reciprocal feedback, onset of magnetic order stabilizes the charge order.