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Energy Transfer in Pr-doped CaTiO₃ Powders under UV Excitation¹ YOHANNES TSEHAY, SHEREEN VELUPILLAI, JOHN COLLINS, Wheaton College Norton MA — Pr-doped powders are being investigated for use as red phosphors in LED-based solid-state lighting applications because of the strong, red, sharp-line praseodymium emission near 613 nm. In this poster we present data on the luminescence of Pr-doped calcium titanate nanocrystals in the temperature region between 7K and 300K. The crystal sizes ranged from ~80 nm to 250 nm. We monitored the emission in the blue-green region (from the titanate system) and the Pr emission under excitation in the UV. The titanate emission occurs mainly at temperatures below 100K and only when excitation is into the conduction band. Excitation across the bandgap also results in a strong Pr emission, showing that there is energy migration from the conduction band to the Pr ion. The decrease in the titanate emission between 7K and 100K is accompanied by an increase in the intensity of the Pr emission, which continues to increase up to 300K. Lifetime measurements indicate that the final step of the transfer of energy from the conduction band to the Pr ion occurs via the charge transfer state of the Pr-titanate complex. Results of the experiment and models of the energy transfer mechanism will be presented.

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