SPECTROSCOPY OF LUMINESCENT CRYSTALS CONTAINING RARE EARTH ELEMENTS

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We have studied the spectroscopy of luminescent crystals containing rare earth elements such as $KEuGe_2O_6$,[a] $Cs_3EuSi_6O_{15}$,[b] $K_4[(UO_2)Eu_2(Ge_2O_7)_2]$, and $R_2(C_8H_{10}O_4)_3$ (R= Y, Tb, or Eu). The emission and excitation spectra of these compounds were recorded at ambient temperature. These spectra are consistent with the structures which were determined by single crystal X-ray diffraction. Crystals containing hybrid luminescent centers were also synthesized and interesting energy transfer mechanisms were observed. For example, dramatic luminescence quenching was found in $KEu_xNd_{1-x}Ge_2O_6$ (x= 0.98, 0.96, 0.94, and 0.84) as well as in $Cs_3Eu_{0.98}Nd_{0.02}Si_6O_{15}$, while different compositions of $Y_xEu_yTb_{2-x-y}(C_8H_{10}O_4)_3$ exhibit different emission colors. Emission lifetimes were also measured for these compounds, and the results shed light on the energy transfer mechanisms. Detailed results of our research will be presented.

[a] P.-L. Chen, P.-Y. Chiang, H.-C. Yeh, B.-C. Chang, and K.-H. Lii, Dalton Trans., 1721 (2008).
[b] M.-Y. Hung, Y.-H. Chen, B.-C. Chang, and K.-H. Lii, Chem. Mater. **17**, 5743 (2005).