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Ce/Cr:YAG Based Yellow/Red Phosphors JINKE TANG, WENDONG WANG, University of Wyoming, SHENG TENG HSU, Sharp Laboratories of America, BRIAN SULLIVAN, University of Wyoming — Ce:YAG (yttrium aluminum garnet) is the current industrial material of choice for phosphor for white LEDs, but suffers from poor color rendering index. We have investigated Cr and Ce co-doped YAG. Our investigation suggests Cr addition can drastically enrich the emission spectrum of Ce:YAG in the red region, which is realized by a non-radiative energy transfer from the Ce3+ 2D3/2 level to Cr3+ 4T level. The emission spectrum excited at 467 nm blue wavelength shows that the addition of Cr induces strong peaks in the red region. Comparison with the emission spectrum of the Cr-only sample reveals that the intensity of red Cr emission is much higher in Ce and Cr co-doped samples, which suggests energy transfer from Ce to Cr. Excitation spectra collected at the Cr red emission show a large excitation peak at 458 nm and suggest energy transfer from the 2D3/2 level of Ce3+ to the 4T level of Cr3+, which is responsible for the enhanced red emission from Cr. At the same time, radiative transfer from Ce3+(2D3/2) to Cr3+(4T) through the absorption of the yellow emission by Cr seems limited. The orders of magnitude increase in the Cr red emission in Ce/Cr:YAG compared to Cr:YAG suggests that the former is an efficient red and yellow phosphor.

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