American Mineralogist, Volume 87, pages 1144–1147, 2002

Submicrometer optical characterization of the grain boundary of optically active Cr^{3+} doped polycrystalline Al_2O_3 by near-field spectroscopy

YOSHIHITO NARITA[1,*] AND HIROSHI MUROTANI[2,†]

[1]JASCO Corporation, 2967-5, Ishikawa-cho, Hachoji-shi, Tokyo 192-8537, Japan
[2]Department of Electro Photo Optics, Tokai University, 1117 Kitakaname, Hiratsuka-shi, Kanagawa 259-1292, Japan

ABSTRACT

Near-field fluorescent spectroscopy was used to characterize the grain boundary of Cr-doped polycrystalline alumina. The results show that the peak widths in near-field spectra are narrower than in spectra obtained by conventional microspectrometry, and this is attributed to the difference in spatial resolution of the two methods. The R-line peaks of Cr^{3+} fluorescence were observed to shift to a lower wavelength at the grain boundary compared to the bulk crystal, which is attributed to stress relief at the crystal boundary. This peak shift at the boundary decreases as a function of the time a polycrystal is annealed at 1700 °C.