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As a heavy rare earth oxide, erbium oxide (Er_2O_3) has many attractive properties. Monoclinic Er_2O_3 has useful properties not found in stable cubic Er_2O_3, such as unique optical properties and high radiation damage tolerance. In this study, pure cubic and mixed phase of cubic and monoclinic Er_2O_3 coatings were prepared. Photoluminescence properties of these coatings were characterized by a confocal micro-Raman spectrometer equipped with 325, 473, 514, 532, 633 nm lasers, and the influence of microstructure on the fluorescence properties was analyzed in detail. The room temperature fluorescence peaks of cubic Er_2O_3 were assigned. Furthermore, a novel method for rapid phase identification of Er^{3+} doped cubic and monoclinic rare earth sesquioxides at room temperature was proposed.

KEYWORDS: erbium oxide; phase identification; photoluminescence spectra; monoclinic phase; energy levels.

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