THE RADIATIVE RECOMBINATION AND DEFECT CENTERES IN YTTRIA-STABILIZED ZIRCONIA SINGLE CRYSTALS.

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Yttria stabilized zirconia (YSZ) is well known as a solid state elecrtolyte. Introduction of Y^{3+} in the zirconium sublattice of YSZ implies the formation of oxigen vacancies which controll properties of the crystall. This work intends to reveiw some results on radiative recombination investigations. The γ- and thermo-stimulated luminescence in ZrO_2-Y_2O_3 (12%) were studied.

A characteristic green luminescence under γ-ray excitation was observed. In order to elucidate the origin of this luminescence the temperature dependence of the emission spectrum was teken. Two salient features are observed: (i) the emission band shape is obvious asymmetric, and (ii) the band peak position shifts from 2.6 to 2.3 eV as the temperature is increased from 77 to 300 K. These features indicate the luminescence band is not simple and, it supposed, that it consists of two elemental bands, as minimum, which have contrariwise inten-sity temperature dependence.

The two thermo-luminescence bands of 2.6 and 2.3 eV were excited at 190 and 290 K respectively. When the short-wave luminescence band quenches, one can see the bleaching of tupical low-temperature broad absorbption band at the 2.2 eV. High-temperature treament in air leads to increasing of the intensity of the 2.6 eV band and decreasing of the 2.3 eV one. This supposed the 2.6 eV emission is intrinsic and is caused by radiative decay of the exciton-like state. This is a result of recombination of gree electron wits hole centre, responsible for the 2.2 eV absorbption band. The 2.3 eV emission is ascribed to an intrinsic defect in cubic stabilized zirconia