

STRUCTURAL
COMPOSITION OF A SILICON-OXYGEN
INTERLAYER IN PHOTOLUMINESCENT
Al₂O₃ FILMS WITH Si NANOCRYSTALS

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S u m m a r y

Photoluminescent Al₂O₃ films with Si quantum dots were obtained by the method of pulsed laser deposition. The silicon-to-aluminum ratio in the target was varied. The photoluminescence spectra in the range 1.4–3.2 eV and the infrared absorption ones in the range 850–1400 cm⁻¹ were measured. For all specimens, the infrared band associated with the absorption by Si–O bonds was observed, which testified to a presence of an intermediate silicon-oxygen phase at the Si nanocrystal–Al₂O₃ interface. Molecular complexes Si–O_y–Si_{4–y} (1 ≤ y ≤ 4) were analyzed in the framework of the random bond model. Interrelations among the target composition, the structural composition of silicon-oxygen interlayer, and the photoluminescence properties of the films were determined.