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Electroluminescence and photoluminescence properties of the Er-doped silicon-rich silicon oxide films deposited by pulsed laser deposition

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The photoluminescence properties of Er-doped SRSO(Silicon-Rich Silicon Oxide) films deposited by PLD(Pulsed Laser Deposition) method were reported elsewhere[1]. We annealed samples that were grown by PLD method at temperatures from 400℃ to 1000℃ in N_2 ambien. And we observed photoluminescence of these samples in visible range and in 1.54 μm-I.R. range. In order to inject charge carriers for the radiative recombination efficiently, we manufactured Er-doped SRSO light emitting diode containing a p-n junction structure, and measured electroluminescence at room temperature under the bias voltage. The experimental results showed that the photoluminescence and electroluminescence properties of the PLD-fabricated Er-doped SRSO films originated from the decrease of the energy-backtransfer rate(from Er^{3+} to SiO_x) by the large bandgap of SRSO, not from that of the nanocrystalline silicon.

[참고문헌]

1. Jeong Sook Haa, Chang Hyun Bae, Sang Hwan Nam, Seung Min Park, Young Rae Jang and Keon Ho Yoo, and Kyoungwan Park, Appl. Phys. Lett. 82, 3436 (2003).