

## Luminescence Properties of Nanostructured Zn-Si-O Composite Films Deposited by RF Sputtering

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Luminescence properties of Zn-Si-O composite films grown on Si substrates by rf sputtering were studied. Zn-Si-O composite films were deposited by using Si and ZnO targets simultaneously. ZnO targets with a diameter of ~10 mm were placed on Si target with a diameter of 2 inches. Number of ZnO target was varied to control the film composition. After deposition, the films were heat-treated at various temperatures (400~900 °C) for 3 min in a N<sub>2</sub> atmosphere by rapid thermal annealing process and film composition was measured by using RBS. From the results of CL measurements, the film deposited with 4 ZnO targets and annealed at 700 °C exhibited strong and broad emissionband at the wavelength of ~400 nm. This emission peak was also found in the film deposited with 2 ZnO target although it was very weak, and did not appear in the films deposited with 6 and 8 ZnO targets. The annealing temperature was also found to affect the intensity of 400 nm emission band. To understand these phenomena, the films were characterized by XRD, TEM, and FTIR. The XRD and TEM results shows that 4~5 nm ZnSi<sub>x</sub>O<sub>y</sub> particles exist in the film deposited with 4 ZnO targets and annealed at 700 °C. These results indicate that the strong 400 nm emission band is attributed to ZnO particles. The origin of this 400 nm emission band from ZnSi<sub>x</sub>O<sub>y</sub> particles will be also discussed.