

# Studies of the Blue-emitting Electroluminescent Devices

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Thin-film electroluminescent (EL) displays have been extensively investigated because of their many advantages, such as high brightness, rigidity and high viewability. There is an intense demand for a full-color EL display panel. However, the lack of appropriate phosphor materials with blue EL emission makes it difficult to realize full-color EL panel.

A new MSD method for a preparation of SrS:CeCl<sub>3</sub> phosphor layer with CeCl<sub>3</sub> granules, Sr metal and hydrogen sulfide (H<sub>2</sub>S) gas instead of sulfur was proposed to overcome many problems caused by sulfur source. This method was confirmed to be able to prepare thin films with good crystallinity and with good reproducibility. Stable EL devices were achieved by using AlN first insulating layer and Ta<sub>2</sub>O<sub>5</sub> second insulating layer.

Some models had been proposed for explanations of EL characteristics of SrS:Ce EL devices. However, the details have not been clear yet. We proposed a new model including formation of shallow interface states induced by oxygen, dependence of distribution function of interface states on insulator materials and accumulation of positive space charge induced by ionization of Ce activators. This model could explain the particular characteristics of SrS:Ce EL devices.

The most serious problem of SrS:Ce EL devices is its quick degradation of luminance, origins of which have not been clear yet. We proposed the model of degradation including a change of shallow interface states during driving. This model was proved to explain decrease of the luminance, the transferred charge and the efficiency and a change of the light output waveforms. The SrS:Ce EL devices with long life will be achieved by the realization of stable interface. This study clarified the emission mechanism and degradation mechanism of SrS:Ce EL devices.