Powder synthesis and photoluminescence properties of a new yellow-emitting Eu-doped Sr-α-SiAlON phosphor, $Sr_{1+x}Si_{28-2x}Al_{2+2x}N_{40}$ (x=2)

Mehdi Estili[1], Rong-Jun Xie[2], Kohsei Takahashi[1], Lihong Liu[1], Shiro Funahashi[1], Tohru Suzuki[1], Naoto Hirosaki[1]

NIMS [1], Xiamen University[2]

E-mail: ESTILI.Mehdi@nims.go.jp

We report powder synthesis and photoluminescence properties of a new yellow-emitting Eu-doped Sr-α-SiAlON phosphor, $Sr_{1+x}Si_{28-2x}Al_{2+2x}N_{40}$ (x=2), which is discovered by the single-particle-diagnosis approach in our group. [1] This new phase crystallizes in hexagonal structure with *P*-6 space group and lattice parameters of a = 7.9395 Å and c = 14.3822 Å.

Powder samples with high phase-purity are obtained with a solid-state reaction method by using all-nitride precursors. The 3 mol% Eu-doped powder shows a broad excitation band from UV to 570 nm with a maximum at about 310 nm. Excitation with 400 nm blue light leads to a broad emission band centered at about 584 nm (FWHM = 93 nm) with an internal quantum efficiency of 65%. Temperature-dependent emission intensity measurements confirm a superior thermal stability, for which over 70% of room-temperature luminescence is maintained at 300 °C.

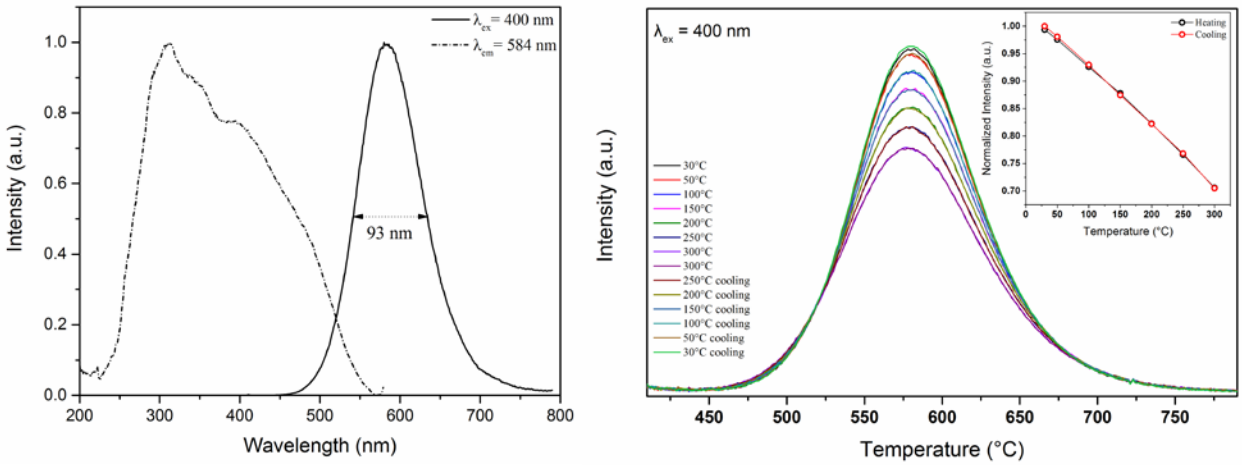

Fig. 1 Excitation and emission spectra of 3 mol% Eu-doped $Sr_{1+x}Si_{28-2x}Al_{2+2x}N_{40}$ (x=2) phosphor powder (**left**) and temperature-dependent emission spectra under 400 nm excitation (**right**).

[1] N. Hirosaki, T. Takeda, S. Funahashi, R.-J. Xie, Chem. Mater., 2014, 26, 4280-4288.