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Vacuum ultraviolet investigations of $Y(Ta,Nb)O4:Eu^{3+},Tb^{3+}$ phosphors.

SuWoong Lee[1], Mihail Nazarov[2], DoYoung Noh[2]*

[1]Graduate Program of Photon Science and Technology, Gwangju Institute of Science and Technology, 1 Oryong-dong, Buk-gu, Gwangju 500-712, Republic of Korea

[2]Department of Materials Science and Engineering, Gwangju Institute of Science and Technology, 1 Oryong-dong, Buk-gu, Gwangju 500-712, Republic of Korea

*Corresponding author: email: dynoh@gist,ac.kr

The growing interest towards luminescence spectroscopy of rare earth ions in the vacuum ultraviolet (VUV) is due to industrial demands for new applications. Europium and terbium activated yttrium tantalate, ytrium niobium-tantalate and yttrium niobate phosphors were prepared by solid state reaction, from homogeneous mixture consisting of Y_2O_3, Eu_2O_3, Tb_4O_7, Ta_2O_5, Nb_2O_5, and Na_2SO_4 as flux.

Phosphor powders with variable photoluminescence colours from blue-togreen-to-yellow-to-red were obtained by thermal synthesis. VUV and UV excitations, photoluminescence spectroscopy, SEM, Raman spectroscopy, X-ray diffraction and FTIR spectroscopy were used to investigate the structural and luminescent properties of $Y(Ta,Nb)O_4:Eu^{3+},Tb^{3+}$ phosphors.

VUV excitation spectra of samples were measured using a VUV spectrophotometer equipped with vacuum monochromator (ARC, VM 502) and a light source of 30W deuterium lamp (ARC, DS 775-100). Under ultraviolet excitation (254 nm), non-activated yttrium tantalate phosphor exhibits a very weak ultraviolet emission, but VUV excitation (147 nm) gives a good emission with maximum at about 390 nm.

The partial replacement of tantalum with niobium atoms strongly improves the luminescence emission and shifts the broad emission band toward longer wavelengths. Moreover, we investigated various compositions $Y(Ta,Nb)O_4$:Eu,Tb with different Nb and activator concentrations and have found some compounds with very strong emission under VUV excitation. Such phosphors could be proposed as very good emissive materials for PDP and Lightings.