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Journal Name

Supplementary information

Eu^{3+} - doped $Y_{3-x}Nd_xAl_3O_{12}$ garnet: synthesis and structural investigation

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Nd^{3+}-doped yttrium aluminium garnet and Eu^{3+} - Nd^{3+}-co-doped yttrium aluminium garnet have been synthesized by environmental friendly sol-gel method in low temperature. The results of X-ray diffraction (XRD) analysis of the powders sintered at 1000 °C showed the purity and formation of monophasic compounds. The phase composition and purity confirmation of the samples was also characterized by FTIR spectroscopy. Desirable microstructural features and particle size of phosphorous materials of the polycrystalline samples were studied by scanning electron microscopy (SEM). The local environments of Eu^{3+} and Nd^{3+} activator ions of garnets structure compounds were investigated by nuclear magnetic resonance (NMR) spectroscopy. The local environments of the small number of substituted phosphorous ions (Eu^{3+} and Nd^{3+}) in YAG are shown to critically influence optical properties. Structural features of garnets were found to correlate with their luminescence properties. The luminescence properties were characterized using the results from photoluminescence (PL) study. Effective concentration of luminescent ion - Nd in YAG was observed and optimum ratio between two phosphorous (Eu^{3+} and Nd^{3+}) was analysed. Determined the transition among europium and neodymium phosphorus.

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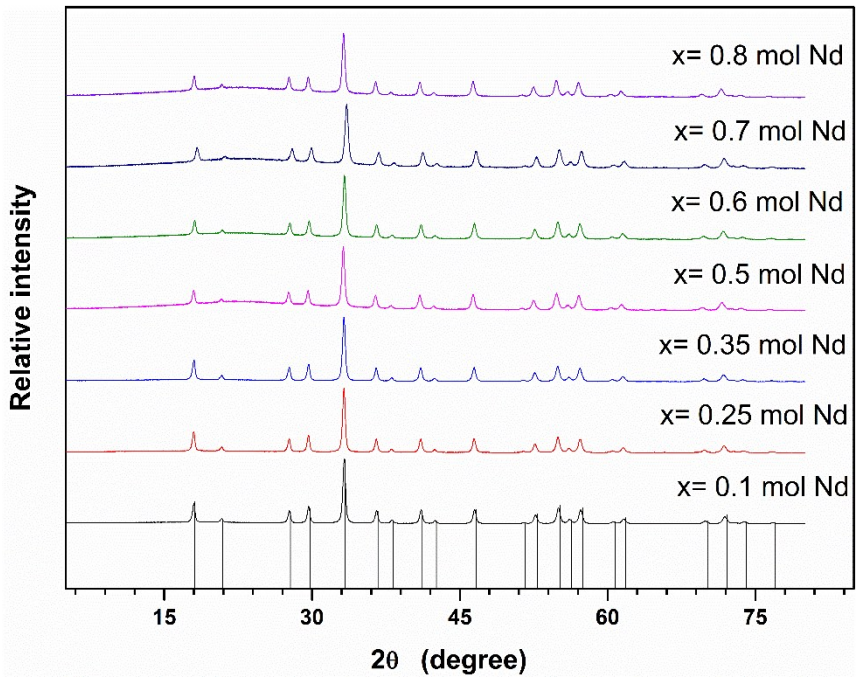

Figure s1. XRD patterns of the $Y_3Al_5O_{12}$:Nd samples annealed at 1000 °C for 10 h. Vertical lines represent the standard XRD pattern of YAG.

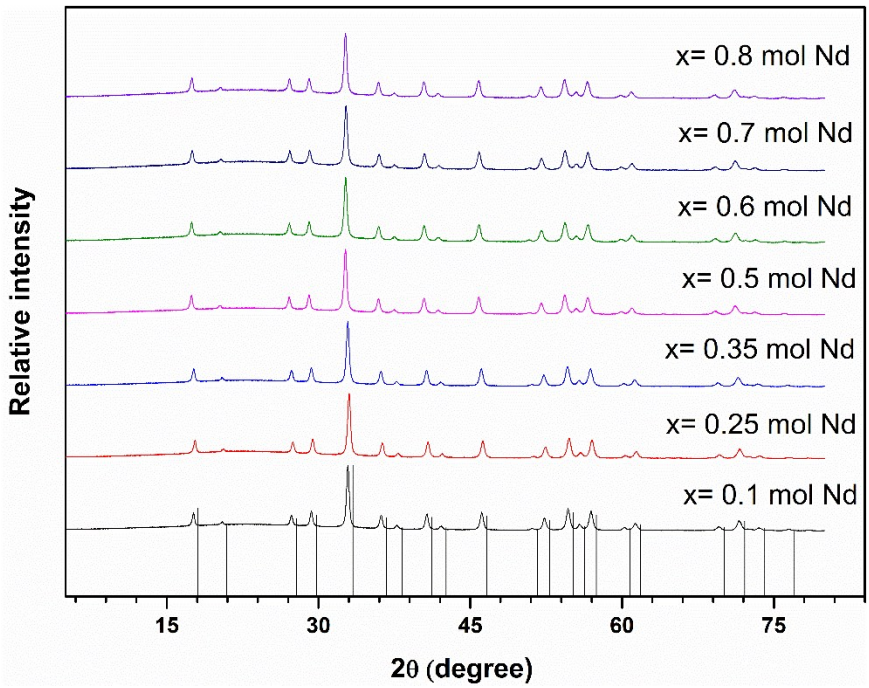

Figure s2. XRD patterns of the Y3-xNdxAl5O12:0.5% samples annealed at 1000 oC for 10 h. Vertical lines represent the standard XRD pattern of YAG.

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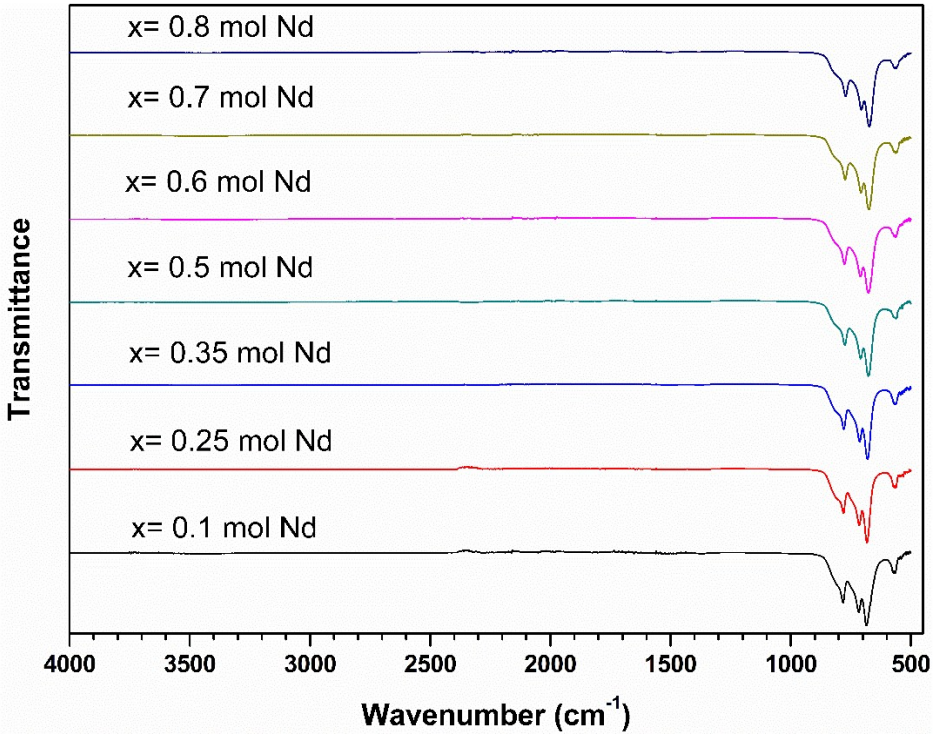

Figure s3. FTIR spectra of the $Y_{3-x}Nd_xAl_5O_{12}$ samples annealed at 1000 °C for 10 h.

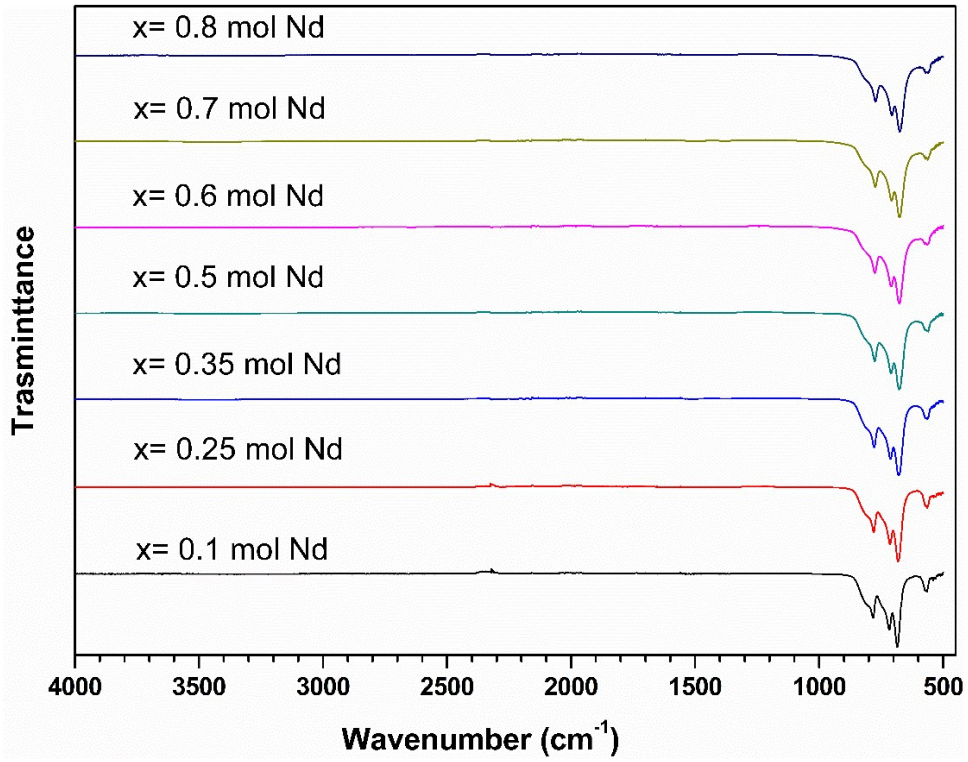

Figure s4. FTIR spectra of the $Y_{3-x}Nd_xAl_5O_{12}$:0.5%Eu samples annealed at 1000 °C for 10 h.

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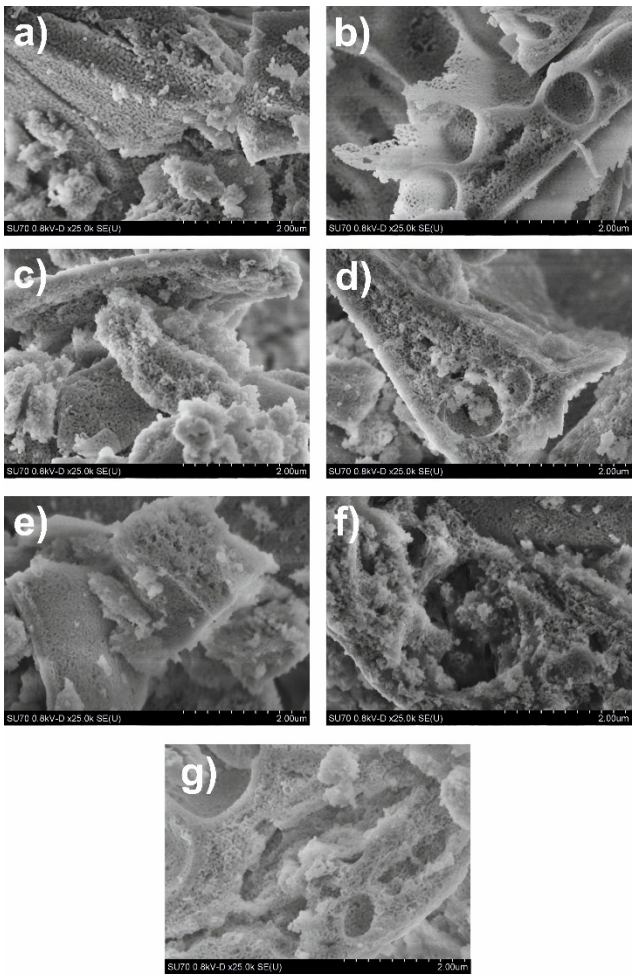

Figure s5. SEM micrographs of $Y_{3-x}Nd_xAl_5O_{12}$ garnets (a-0.1; b-0.25; c-0.35; d-0.5; e-0.6; f-0.7; g-0.8).

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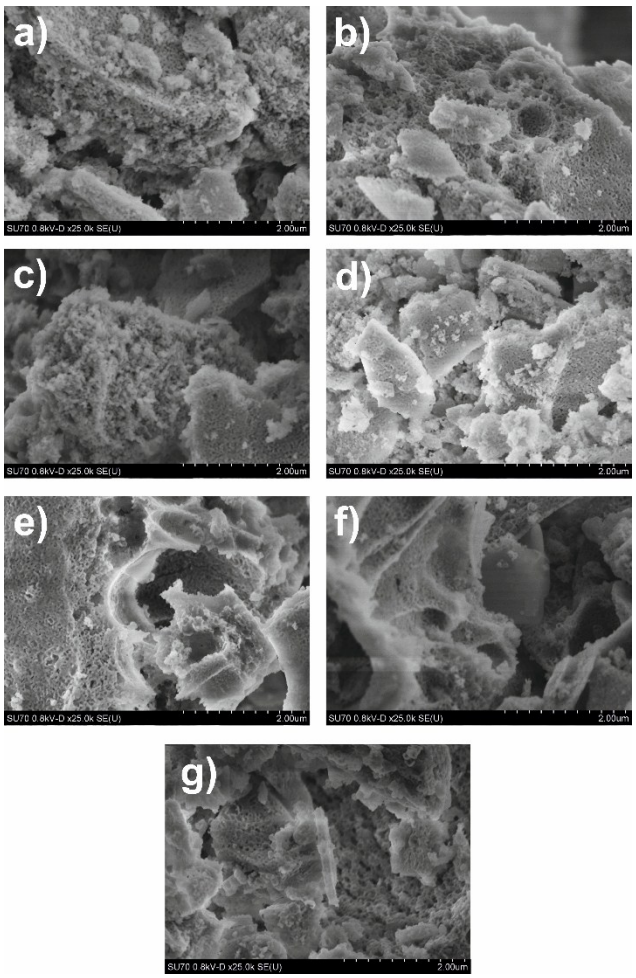

Figure s6. SEM micrographs of $Y_{3-x}Nd_xAl_5O_{12}$:0.5%Eu garnets (a-0.1; b-0.25; c-0.35; d-0.5; e-0.6; f-0.7; g-0.8).

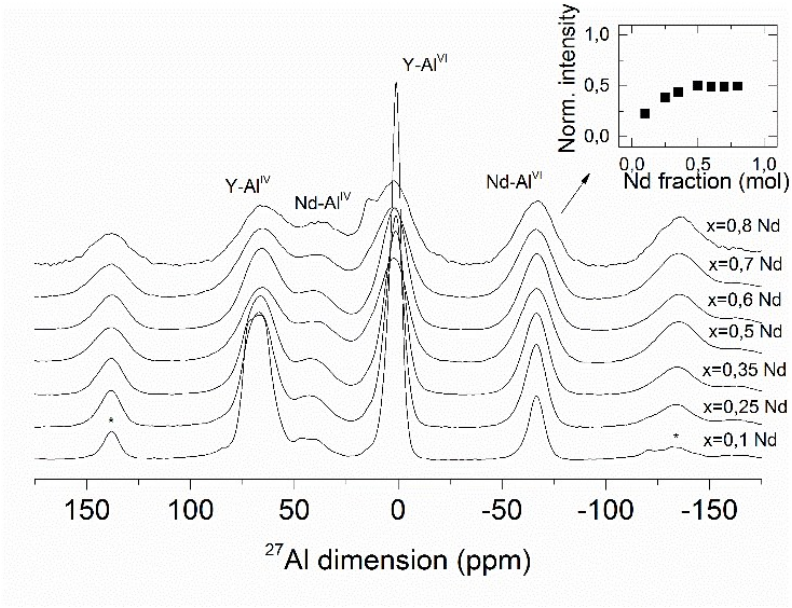

Figure s7. ^{27}Al NMR spectra of $Y_{3-x}Nd_xAl_5O_{12}$ samples.

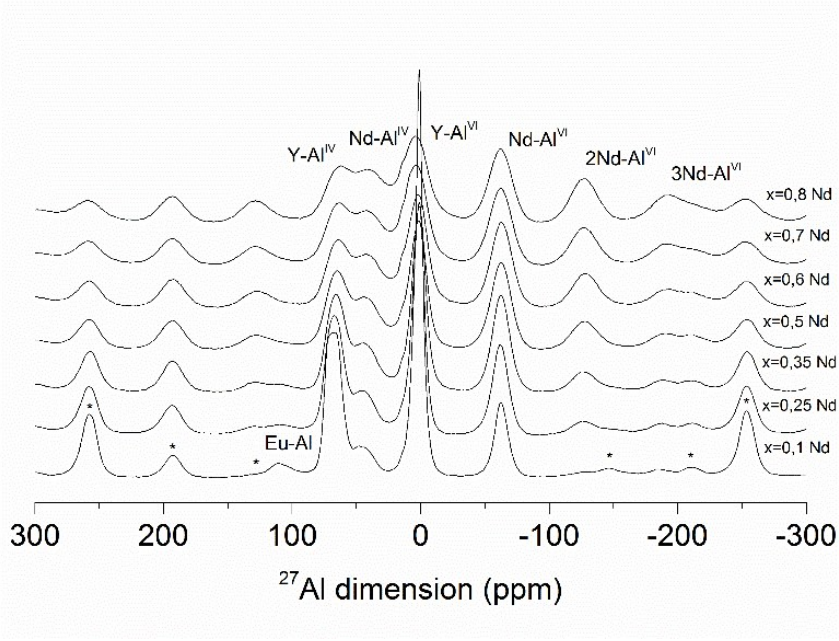

Figure s8. ^{27}Al NMR spectra of the $Y_{3-x}Nd_xAl_5O_{12}$:0.5% Eu samples.

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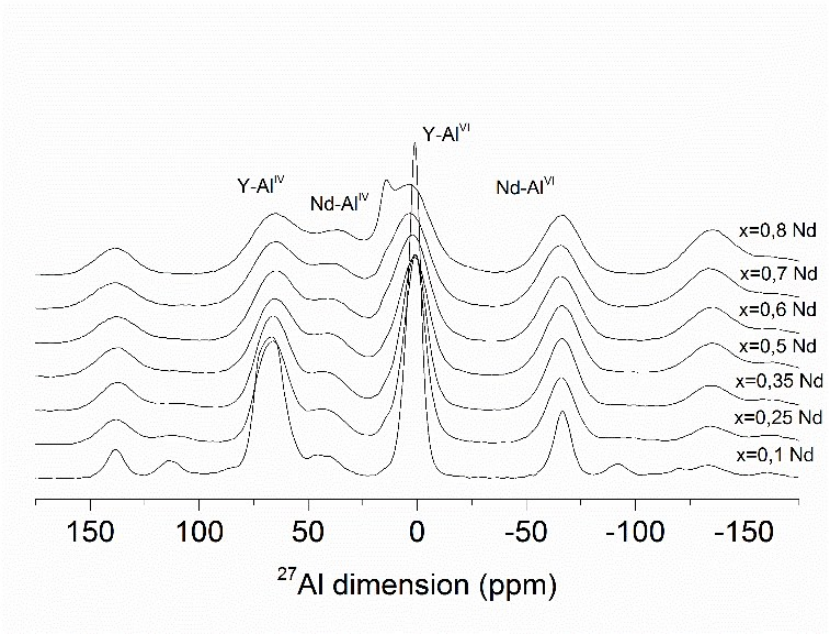

Figure s9. ^{27}Al NMR spectra of the $Y_{3-x}Nd_xAl_5O_{12}$:1%Eu samples.