In this work we studied properties of garnet scintillator layers ($R_xLu_{3-x}Al_5O_{12}$, $R_xY_{3-x}Al_5O_{12}$) doped by rare earth ions (Ce, Pr, Tb), orthosilicates (Y_2SiO_5; R = Ce, Tb) and influence of Sc codoping on Pr^{3+} and Tb^{3+} emissions. The Zr codoping on Ce^{3+} emission in orthosilicates was also studied. The samples were prepared by liquid phase epitaxy. The studied materials show high quantum efficiency and good chemical and mechanical stability. They represent ideal materials for 2D imaging devices. We studied optical absorption, excitation and emission spectra and scintillation properties (radiolunescence and photoelectron yield). The aim was to determine the properties of grown layers and their comparison to Czochralski grown single crystals. We looked for the impact of melt and growth conditions on measured layer properties. We also tried to determine optimal amount of dopants in layer. We used PbO - B_2O_3 and BaO - BaF_2 - B_2O_3 fluxes. Using these fluxes, we succeeded in growing layers with less intrinsic defects in crystal lattice in comparison to single crystals. In grown layers of thickness from 1 to 30 μm higher dopant concentration was achieved than in single crystals.