# Development of rare-earth doped fluoride-phosphate glass scintillators

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The development of materials capable of sensing UV and ionizing radiation as X-rays is very important for the areas of nuclear physics, medical imaging technologies and national security.[1] Most of the scintillators commercially available are based on crystalline materials (inorganic or organic), however, the great difficult in preparing them with practical dimensions and low cost, limits their use in the devices. As an alternative, increasing interest has been demonstrated for glass scintillators, owing to the advantages of lower cost and easier manufacturing in different sizes and shapes. The efficiency of induced scintillation in glasses depends on both effective atomic number and the photoluminescence quantum efficiency. In this work, we demonstrate that different series of $Nd^{3+}$, $Tb^{3+}$and $Ce^{3+}$doped high-density fluoride-phosphate glasses containing heavy elements as bismuth, indium and gadolinium could be prepared and their luminescence properties under UV and X-ray radiation were analyzed in order to verify their potential as glass scintillators. The introduction of $BiF_3$to the glass system leads to a decrease in glass stability but, on the other hand, to an increase in glass density. Under UV and X-ray excitation, the glasses showed an intense emission in the visible and IR region of the electromagnetic spectrum, compatible with the region of greatest sensitivity of photodetectors used in radiation sensors. The results indicate that these glasses are promising scintillating materials for applications that demands both fast and lowest timing decay as X-ray radiography and computer tomography.

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