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# $BiF_3$ incorporation in RE doped fluoride-phosphate glasses for high energy radiation detectors

View Session Detail

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**Abstract Body:** A wide range of rare-earth (RE) doped fluoride-phosphate (FP) glasses have been investigated for lasers and other photonic devices. They combine the desirable optical properties of fluoride glasses with the improved glass forming ability of phosphates, and the rich energy level structure of the RE ions allows efficient frequency conversion. The resulting FP glasses have low refractive indexes, long-term resistance to high-energy radiation and a wide intrinsic transmission range. Of special interest is the application of FP glasses for detection and sensing of UV and ionizing radiation (e.g. x-ray). In this work, the effect of the incorporation of $BiF_3$ in the structural and optical properties of FP glasses with nominal composition $10In(PO_3)_3$-$30InF_3$-[(60-x)$BaF_2$-$SrF_2$-$ZnF_2$)]-x$BiF_3$, $0 \leq x \leq 40$ mol%, has been studied. Solid-state NMR and Raman spectroscopies were employed to analyze the effect of Bi in the glassy network. Results indicate a progressive depolymerization of the $Q^1$ backbone with breakage of P-O-P bridges and formation of clustered regions of alkali-earth metals and Bi interacting with fluorine. The Tg values range from 297 to 316 °C. Luminescent properties of $Tb^{3+}$ doped (0–6 mol%) glasses were also studied. Under UV and X-ray excitation, the glasses show intense emission, compatible with the spectral region of highest sensitivity of radiation sensor detectors.