



## The role of Bi<sub>2</sub>O<sub>3</sub> on the thermal, structural and optical properties of tungsten-phosphate glasses

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Titre	The role of Bi <sub>2</sub> O <sub>3</sub> on the thermal, structural and optical properties of tungsten-phosphate glasses
Type de publication	Article de revue
Auteur	Manzani, Danilo [1], de Araújo, Cid B [2], Boudebs, Georges [3], Messaddeq, Younes [4], Ribeiro, Sidney J.L. [5]
Type	Article scientifique dans une revue à comité de lecture
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Résumé en anglais	<p>Glasses in the ternary system (70 - x)NaPO<sub>3</sub>-30WO<sub>3</sub>-xBi<sub>2</sub>O<sub>3</sub>, with x = 0-30 mol %, were prepared by the conventional melt-quenching technique. X-ray diffraction (XRD) measurements were performed to confirm the noncrystalline nature of the samples. The influence of the Bi<sub>2</sub>O<sub>3</sub> on the thermal, structural, and optical properties was investigated. Differential scanning calorimetry analysis showed that the glass transition temperature, T<sub>g</sub>, increases from 405 to 440 °C for 0 ≤ x ≤ 15 mol % and decreases to 417 °C for x = 30 mol %. The thermal stability against devitrification decreases from 156 to 67 °C with the increase of the Bi<sub>2</sub>O<sub>3</sub> content. The structural modifications were studied by Raman scattering, showing a bismuth insertion into the phosphate chains by Bi-O-P linkage. Furthermore, up to 15 mol % of Bi<sub>2</sub>O<sub>3</sub> formation of BiO<sub>6</sub> clusters is observed, associated with Bi-O-Bi linkage, resulting in a progressive break of the linear phosphate chains that leads to orthophosphate Q<sub>0</sub> units. The linear refractive index, n<sub>0</sub>, was measured using the prism-coupler technique at 532, 633, and 1550 nm, whereas the nonlinear (NL) refractive index, n<sub>2</sub> was measured at 1064 nm using the Z-scan technique. Values of 1.58 ≤ n<sub>0</sub> ≤ 1.88, n<sub>2</sub> ≥ 10-15 cm<sup>2</sup>/W and NL absorption coefficient, α<sub>2</sub> ≤ 0.01 cm/GW, were determined. The linear and NL refractive indices increase with the increase of the Bi<sub>2</sub>O<sub>3</sub> concentration. The large values of n<sub>0</sub> and n<sub>2</sub>, as well as the very small α<sub>2</sub>, indicate that these materials have large potential for all-optical switching applications in the near-infrared.</p>
URL de la notice	<a href="http://okina.univ-angers.fr/publications/ua6611">http://okina.univ-angers.fr/publications/ua6611</a> [6]
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