

Structure and properties of barium tungstate-phosphate glasses

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Phosphate glasses of the BaO-P₂O₅-WO₃ system were studied in five compositional series: (A) (50-x/2)BaO-xWO₃-(50-x/2)P₂O₅, (B) 50BaO-yWO₃-(50-y)P₂O₅, (C) 40BaO-zWO₃-(60-z)P₂O₅, (D) (60-u)BaO-uWO₃-40P₂O₅ and (E) vBaO-40WO₃-(60-v)P₂O₅. Thermal behavior of the glasses was studied by differential thermal analysis and dilatometry and the glass structure was studied by Raman and ³¹P MAS NMR spectroscopies. The glass transition temperature, T_g, increases in all compositional series with increasing WO₃ content. In glasses with a low WO₃ content Raman spectra show on the domination of strong vibrational bands of terminal oxygen atoms in WO₆ octahedra at 885 and 945 cm⁻¹ (vibration of W=O and W-O⁻ bonds in tungstate structural units). On the Raman spectra of glasses with a high WO₃ content, a broad band at 820-841 cm⁻¹, ascribed to W-O-W bonds, was assigned to the formation of clusters composed of WO₆ units. ³¹P MAS NMR spectra shows on the shortening of phosphate chains in the glass network.

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