Effects of MnO-Doping on the Structure of Sodium Metaphosphate Glasses

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A combined structural study on ternary phosphate glasses $(MnO)_x(NaPO_3)_{1-x}$, $x = 0.0$, 0.024, 0.048, 0.167, is performed using X-ray diffraction, EXAFS and Raman spectroscopy. The mean Mn-O nearest-neighbour distance and the Mn-O coordination number in the glass with 16.7 mol% MnO are 2.15(2) Å and 5.7 ± 0.4, respectively. Depolymerization of the metaphosphate chains in the $NaPO_3$ glass structure is observed with increasing MnO content by Raman scattering. This leads to a strong decrease of the average chain length and a small decreasing of the average P-O-P bridging angle with increasing MnO content.

Key words: Phosphate Glasses; Transition Metals; X-ray Diffraction; Raman Spectroscopy; EXAFS.