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A High Energy X-Ray Diffraction Study of the Atomic-Scale Structure of Novel Vitreous Rare Earth Phosphates[1] ERANDI S. GUNAPALA, G.K. MARASINGHE, Department of Physics and Astrophysics, University of North Dakota, Grand Forks, ND 58202, CHRIS J. BENMORE, Advance Photon Source, Argonne National Laboratory, Argonne, IL 60439 — The magneto-optical properties of rare earth phosphate glasses make them good candidates for numerous potential applications including high-energy/high power ($\sim 10^{15}$ watt) lasers. Because, properties of these materials depend heavily on their atomic structure, a detailed study can facilitate development of additional applications. A series of $(Pr_2O_3)_x(P_2O_5)_{1-x}$ glasses where $0.05 \leq x \leq 0.25$ had been characterized by high energy X-ray diffraction. Coordination parameters for nearest coordination neighbors were obtained by Gaussian fitting. The P-O coordination number, N_{PO}, and the P-O, O-O, P-P distances were found to be insensitive to the Pr_2O_3 content. Coordination numbers N_{PrO} decreased from ~ 8.0 to ~ 7.5 with increasing Pr_2O_3 content from 0.12 to 0.23. Pr-O distance did not seem to vary with Pr_2O_3 content in the x range that we studied.

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