

An X-ray and Neutron Scattering Study of the Structure of Zinc Vanadate Glasses

Uwe Hoppe, Rainer Kranold, Emil Gatt^a, Jörg Neuefeind^b, and David A. Keen^c

Universität Rostock, Fachbereich Physik, D-18051 Rostock

^a University of Chemical Technology & Metallurgy, 1756 Sofia, Bulgaria

^b Hamburger Synchrotronstrahlungslabor HASYLAB am Deutschen Elektronensynchrotron DESY, Notkestr. 85, D-22607 Hamburg

^c ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, OX11 0QX, UK

Reprint requests to Dr. U. H.; Fax: +49 381 4981726, E-mail: Hoppe@physik1.uni-rostock.de

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The short-range order of vitreous V_2O_5 and of three $(ZnO)_x(V_2O_5)_{1-x}$ glasses with $x = 0.2, 0.4$, and 0.5 is studied by X-ray and neutron diffraction experiments where the change of the contrast allows to resolve the V–O and Zn–O correlations. The V–O and the Zn–O first-neighbor peaks are approximated by several Gaussian functions. In case of vitreous V_2O_5 two obvious V–O distances exist which are related with VO_4 and VO_5 units. With ZnO additions the V–O coordination number decreases from 4.4 in vitreous V_2O_5 to 4.0 in the metavanadate glass where the strongest decrease of the fraction of VO_5 units is found for glasses of $x < 0.2$. Dominantly, the VO_5 groups are linked with the neighboring units by corners. The Zn–O coordination numbers of the modified glasses are about five with closest distances of $\cong 0.200$ nm.

Key words: Neutron Scattering; X-ray Scattering, Short-range Order; Vanadate Glasses.