

Abstract Submitted
for the NEF05 Meeting of
The American Physical Society

Infrared Studies of Titanium-Containing Vitreous Silica¹ CARRIE E. BLACK, University of Vermont, CHRISTOPHER C. HOMES, Brookhaven National Laboratory, DAVID Y. SMITH, University of Vermont and Argonne National Laboratory — The reflectivity of samples of Corning's ULE glass (7.5% Ti and 92.5% silica), was measured from 18 cm⁻¹ to 30000 cm⁻¹. The refractive index and extinction coefficient were then calculated using the Jahoda-Velicky dispersion relation. The resulting infrared absorption spectrum is almost identical to that of vitreous silica with the exception of a new absorption band at 941 cm⁻¹. The negligible change in the vitreous silica part of the absorption is taken to imply that, at the concentrations present, titanium has little effect on the SiO₂ network and the environment of Si⁴⁺ ions. The phase diagram for TiO₂-SiO₂ systems and titanium EXAFS measurements² indicate that titanium is tetrahedrally coordinated by O²⁻ ions in ULE glass, i.e., it substitutes for Si⁴⁺. On this basis the new 941 cm⁻¹ band is attributed to an antisymmetric stretching mode of Ti-O-Si units, corresponding to a perturbation of the prominent Si-O-Si antisymmetric stretching mode³ seen at 1076 cm⁻¹ in vitreous silica. 2. R. B. Gregor, *et al.* *J. Non-Crystalline Solids* **55**, 27 (1983). 3. C. T. Kirk, *Phys. Rev.* **38**, 1255 (1988).

¹Work supported by the U.S. Department of Energy

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Date submitted: 30 Sep 2005

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