

silanol concentration, the behavior change has been understood for surface and interior silanol groups as follows. Silanol concentrations on the silica surface are varied by grinding the silica glass in various humidity. By heat-treatment of the ground silica glass to 600 °C, the hydrogen bonded pair and geminal silanol groups are eliminated. Further heat-treatment of the ground silica glass up to 1100 °C leads to the dehydration of interior silanol group. However, the isolated silanol group on the silica surface is never dehydrated even at 1100 °C.

Keywords: silanol group, silica glass, silica particles, diffuse reflectance infrared fourier transform, DRIFT.

0070 | Chemical state analysis of sulfur in glass by means of conventional x-ray fluorescence

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It is important to understand chemical state of various polyvalent ions in glass because a reduction-oxidation reaction of the polyvalent ion affects to glass quality such as bubble generation, coloration. In this study, the chemical state of sulfur has been investigated in soda-lime silicate glass by means of X-ray absorption fine structure (XAFS), X-ray fluorescence (XRF).

From the XAFS investigation, sulfur exists only as sulfate ion or sulfide ion in the glass. In the XRF investigation, standard materials with various oxidation numbers indicate the chemical shift in a XRF spectrum (S-K α), and the oxidation number shows a linear correlation with S-K α peak energy value. That means measurement of average oxidation number in glass is possible using conventional XRF. Furthermore, Sulfur Redox (sulfide ion/Total sulfur) can be calculated by taking XAFS results in account.

Keywords: Soda-lime silicate glass, chemical state.

0072 | Green and red emissions in tellurite glasses doped with Er³⁺/Yb³⁺ and the influence of metallic nanoparticles

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Metal-dielectric nanocomposites like glasses containing silver and gold nanoparticles have been attracting large attention in the last years. In particular these materials doped with rare-earth ions are promising materials since rare earth ions luminescence may be intensified in the presence of the nanoparticles. Both energy transfer between the nanoparticles and rare-earth ion and/or enhancement of local field which interacts with rare-earth ion located in the proximity of the nanoparticles may contribute for quenching, or enhancement of the luminescence. In this work we investigate for the first time the behavior of infrared-to-visible upconversion (UPC) luminescence from Er³⁺-Yb³⁺ doped TeO₂-PbO-GeO₂ glasses containing metallic nanoparticles (NPs). The enhancement of Yb³⁺ concentration normally causes the increase of the green and red emissions. The purpose of this work is to study the interference of the metallic nanoparticles in Yb³⁺ → Er³⁺ energy transfer mechanism. The samples were prepared by the traditional method of melting/casting process. Optical excitation was achieved with a laser operating at 980 nm in resonance with the Yb³⁺ transition (⁴F_{5/2} → ⁴F_{7/2}). Transmission electron microscopy using a 200 kV equipment was performed to investigate the nucleation and growth of the nanoparticles.

Keywords: tellurite glass, upconversion luminescence, rare earth, metallic nanoparticles.