

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Metallic States of Multicomponent Glasses TERRENCE JACH,
NIST, Gaithersburg, MD — The $K\alpha_3$ and $K\alpha_4$ satellite lines in x-ray fluorescence result from two-electron shake-up transitions. The ratio of these lines in some solids is known to be highly sensitive to the valence band of the material and a well-defined indicator of metallic vs. oxide states. The good energy resolution of a microcalorimeter x-ray detector allows us to determine the ratio in the fluorescence x-ray spectrum of glasses. An investigation of the satellite ratios of Mg and Al $K\alpha$ lines in a multicomponent glass used as a NIST Standard Reference Material shows that these elements appear to be in a metallic state, despite the original constituents of the glass. This result would be hard to determine by x-ray photoemission spectroscopy because of charging effects in the glass. It remains to be determined whether the effect is due merely to incomplete oxidation of the atoms or actual nanoparticle-sized metallic phases in the glass.

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Date submitted: 15 Nov 2010

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