SMALL SPOT AND HIGH ENERGY RESOLUTION XRF SYSTEM FOR VALENCE STATE DETERMINATION

Danhong Li, Zewu Chen and George J. Havrilla
X-ray Optical Systems, Inc and Los Alamos National Laboratory

Polycapillary and doubly curved crystal (DCC) optics coupled with a small spot x-ray source provide a small spot and high energy resolution XRF system. This experimental approach can be used to identify the valence state of a selected target atom using an innovative detection technique. The Cu Kα x-ray beam was chosen as the excitation beam which was focused by a polycapillary optic. A specially designed DCC optic based on Bragg diffraction was used to collect the Kβ fluorescence from the sample and focus the fluorescence on a focal point. The samples of Fe0, Fe+2, Fe+3, Cr0, Cr+3 and Cr+6 were measured for valence state determination. In this paper, the setup for the small spot and high energy resolution XRF system is demonstrated. The experimental principle and procedures are discussed in detail. The experimental results for valence state determination are presented.