

# Study on SCN<sup>-</sup> metal complexes by NEXAFS and resonant photoelectron spectroscopy

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## Introduction

Thiocyanic ion is used as analytical reagent as well as reagent for various synthesis. Its peculiar chemical property is come from three heteroatoms form a linear molecule. To clarify the specific electronic state of SCN<sup>-</sup> ion, NEXAFS spectra and resonant photoemission spectra (RPES) of the SCN<sup>-</sup> in various salts on S L, N K, C K and the absorption edge of the metal were measured in this research.

## Experimental

All the experiments were done at the BL-13C with PHI 1600C. The photoelectron take-off angle was 54.7° relative to the surface normal. The laminar type gratings with a cylindrical surface of 50m-radius grooved 750 l/mm for N K-edge and 350 l/mm for C K-edge were used. The samples were dispersed on Au plate to avoid charging up.

## Results and discussion

Figure 1 shows the changes in the valence-band photoemission spectra recorded by changing excitation energy near N K-edge of NaSCN with absorption spectra of the N K-edge by total electron yield. A large enhancement of auger spectra of N KVV with two peaks and one shoulder was observed at 399.6 eV corresponding to  $\pi^*$  transition. The valence peak at 7 eV is also enhanced at the energy. The peak energy did not change at the beginning of increase indicating contribution of photoelectron.

Figure 2 shows the changes in the valence-band photoemission spectra recorded by changing excitation energy near C K-edge of NaSCN with absorption spectra of the C K-edge by total electron yield. The C KVV auger spectra showed an enhanced peak at 287.2 eV corresponding to  $\pi^*$  transition followed an increasing peak corresponding to absorption at  $\sigma^*$  transition with an energy shift as a normal auger peak as increasing excitation energy. The valence peak at 9 eV is also enhanced at the energy. The net peak intensity of Na 2p at 32eV was not affected by resonant effect in both of N K-edge and C K-edge.

Slightly different valence-band photoemission spectra spectra on the absorption edges and metals were observed.

## References

[1] N.Matsubayashi, T. Tanaka, M. Imamura, H. Shimada, and T. Saito, *Analytical Sciences*, **17**, i119(2001).

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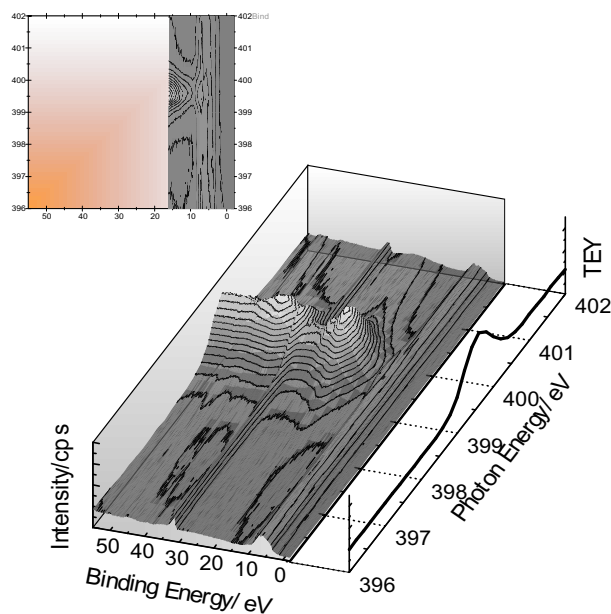


Fig. 1 The valence-band photoemission spectra recorded on N K-edge of NaSCN with absorption spectra of the N K-edge by total electron yield.

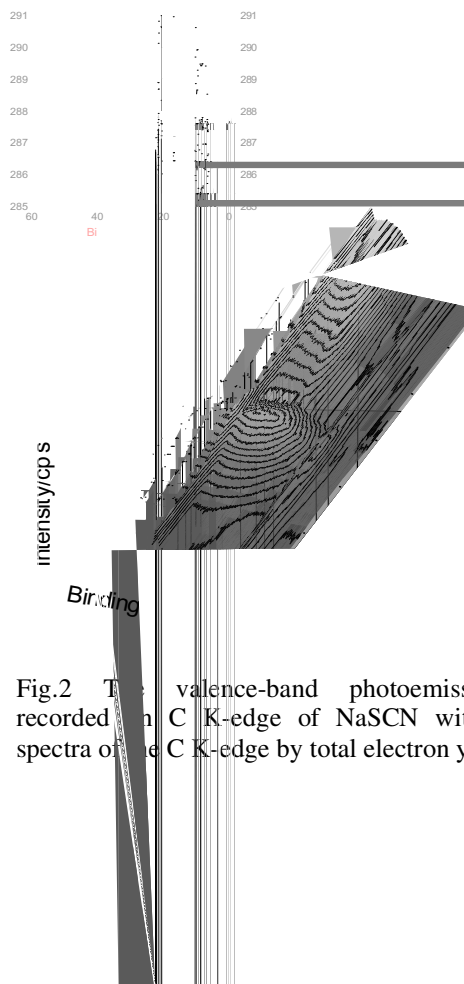


Fig.2 The valence-band photoemission spectra recorded on C K-edge of NaSCN with absorption spectra of the C K-edge by total electron yield.