Soft X-ray Emission User Group

P $K\alpha$ and Pd $L\beta_{2,15}$ Soft X-ray Emission Spectra of Pd-based Bulk Metallic Glasses

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Bulk metallic glasses (BMG's), i.e. bulky multi-component amorphous alloys, show clear glass transition and very strong resistance to crystallization of the supercooled melt [1]. They possess useful engineering properties such as high mechanical strength, good shaping ability, high corrosion resistance, and soft-magnetic properties. Among various BMG's so far discovered, Pd-based BMG's have a remarkably large glass forming ability (GFA). However, they do not satisfy the empirical rules for large GFA [2]. The importance of local nano-clusters in the Pd-based BMG's is suggested for their large GFA [3]. In order to understand the origin of their large GFA and unique properties, we have investigated their electronic structure by x-ray emission and absorption spectroscopy (XES and XAS) combined with photoelectron spectroscopy (XPS) and discrete variational $X\alpha$ (DV-$X\alpha$) cluster calculation [4]. In the present report, we will show experimental results on the Pd $L\beta_{2,15}$ and P $K\alpha$ XES spectra of $Pd_{80-x-y}Ni_xCu_yP_{20}$ BMG, comparing them with the Cu and Ni $L\alpha$ XES spectra as well as the valence-band XPS and relevant XAS spectra.

References

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