[IV-4]

Resolution Enhancement for Electron Spectrum by Deconvolution

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For the purpose of chemical state analysis by several kinds of electron spectroscopy, detecting so small changes on spectrum such as profile changes or energy positions for is so important. However, the resolution of spectrometers becomes the upper limit mechanically in now a days, and it is very often that the changes on spectrum which should be observed are smaller than the resolution of spectrometer.

Several resolution enhancement procedures can be adoptable in such cases. However, most of procedure except an iterative methods on time domain are not so easy to find the optimal condition for obtaining correct and useful results. Recent advances of micro-computer makes possible to carry out the deconvolution process under observing the result of each iteration.

The algorithm adopted in this report is Jansson' method[1], which is a kind of pseudo deconvolution. This method has the very advantage that the artifacts are hard to appear on the result. And, a little insufficient efficiency of enhancement is it's disadvantage. As shown in figures, the result obtained under self-deconvolution condition (100% deconvolution), 300 times iteration (about 10 minutes) by Jansson' method shows no artifact and a little broader than the result under same condition by another iterative method (van Cittert method shown in figure).

Some examples of adopting this method to X-ray photoelectron spectra will be also plesented in the session.

[1] P.A.Jansson : "Deconvolution with Application in Spectroscopy" Academic Press (1986)

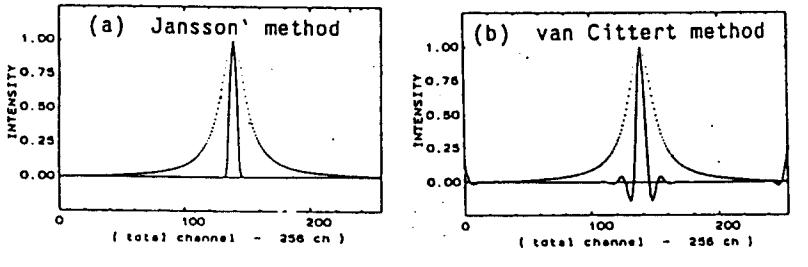

Fig. Comparison between two self-deconvolution results by Jansson' method (a) and van Cittert' method (b). These data were normalized by their peak height.

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