

XPS Data Analysis using Curve Fitting Technique for Polymer Powder

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Determination of component contents in the surface layer of blend polymer powders as toner is very important for controlling the powdering, fusing and the other properties. However, the component proportion at the surface layer of blend polymer powders is not always the same as that of the starting material mixture because segregation of components may occur in the powdering process.

It was found that the XPS data analysis using curve fitting methods is a useful technique for the determination of the component contents in the surface layer. In this analysis, the individual components necessary for the curve fitting are obtained from the spectra of the individual components that constitute the blend polymer powder. Curve fitting was achieved using a software provided by one of the author.

The polymer powders we used in this study were styrenebutyl acrylate containing 2~16wt% polyethylene or polypropylene. Each C 1s spectrum peak was deconvoluted into two spectra peaks, representing styrenebutyl acrylate and polyethylene (or polypropylene), respectively(Fig.1).

It was, therefore, revealed that the contents of polyethylene or polypropylene in the powder surface layer were several times greater than the initial mixing ratio before powdering process. And the contents of polyethylene was greater than that of the polypropylene at the same initial mixing ratio(Fig.2).

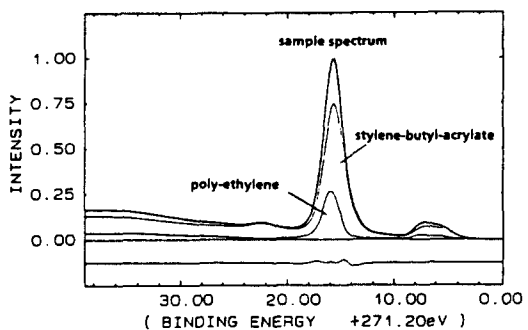


Fig.1. Curve fitting result of C 1s spectrum for styrenebutyl acrylate containing polyethylene. (Mixing ratio is 2wt%).

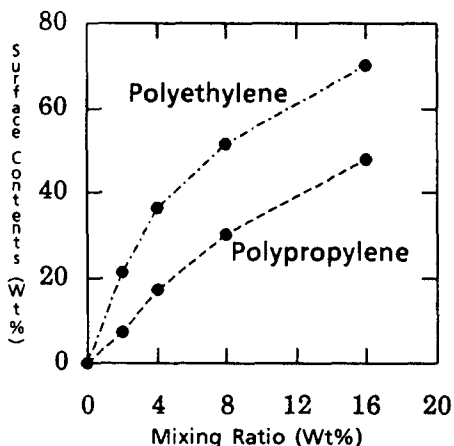


Fig.2. Surface contents of polyethylene or polypropylene at the powders V.S. initial mixing ratio in the matrix polymer.

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