

XPS Studies of Oxygenated Polystyrene Surface

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X-ray Photoelectron Spectroscopy (XPS) has been commonly used to investigate the polymeric surface since it provides the information about the elemental composition as well as the chemical state of various functional groups. However, it has been often failed to differentiate the carbonaceous materials such as graphite and hydrocarbon in the conventional XPS analysis due to the lack of chemical shift for the C1s main peak.

In the present work, we have studied the pure and oxygenated polystyrene surface by means of valence band spectra, X-ray induced Auger electron spectra and energy loss spectra as well as the principal C1s peak.

The C1s peak of the oxygenated polystyrene showed three different chemical states C-O, C=O and O-C=O. Among these chemical states, C-O contribution was higher than the others. The well-defined structure of the valence band spectra for the pure polystyrene was seen in the region of C2s (15 ~ 25eV) and C2p (5 ~ 15eV). As expected, significant changes in the valence band spectra of the oxygenated polystyrene have been observed. Also line shape variation could be found in the C KVV Auger electron spectra. However, with the valence band and the Auger electron spectra, it was not sufficient to localize the bonding position of the oxygen in the oxygenated polystyrene. Energy loss spectra of the C1s peak revealed two distinct features: the disappearance of $\pi \rightarrow \pi^*$ transition due to the reaction with oxygen and no change in the plasmon-dominated loss line. From the above results, we may conclude that oxygen reacts with the benzene ring branch and not with the main chain when oxygen is chemisorbed at the polystyrene surface.