

X-ray absorption spectroscopy of photodamaged polyimide film

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Polyimide, Capton, is a kind of organic polymers including imide bonds, and it has high electrical insulation and mechanical strength, and is used in a variety of applications such as insulating films. It is also known that it has gradually a damage due to light irradiation, but the mechanism is still controversial and the details are not well understood.

In the present study, photo-damaged mechanism is examined by visible light using X-ray absorption spectroscopy (XAS). Photo-damaged polyimide films for 24 – 96 hours are prepared in advance. Then XAS spectra are obtained XAS spectra at C, N, and O K-edges. XAS of polyimide film at the O K-edge is shown in Figure 1. Light irradiation for 48 hours or more shows broadening of the peak at 533 eV derived from the product oxidized by C-N bond cleavage. And by theoretical calculations using density functional theory, XAS spectra of monomer model and corresponding dissociated products are produced.

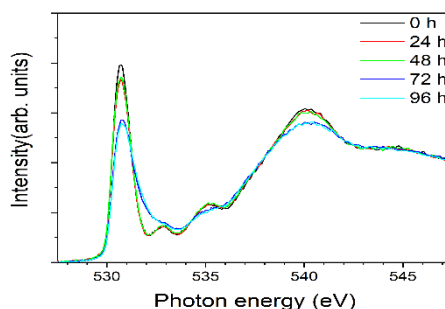


FIGURE 1. XAS spectra of polyimide film at O K-edge.