

Environmentally-Concerned Heavy-Metal Distribution in Adsorbent Gels

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Introduction

After the announcement from the Ministry of Health and Welfare of Japan in 1968 that the cadmium discharged from Kamioka mine in the Jintsu River upstream was suspected to cause the Itai-itai disease, the heavy metal contamination had suddenly attracted much attention. Triggered by this, the concern about heavy-metal environment pollution increased greatly and the heavy metal effluence has been regulated severely. In these conditions, the situation has been remarkably improved on the heavy metal contamination. One may have a view that the heavy-metal environmental pollution has been already solved nowadays. However, they must realize that harmful heavy metals which have already been flown out into the environment will not disappear and that the polluted area will spread out by diffusion. In order to prevent the heavy metals from spreading out into a wide area, efficient recovery and fixation systems are indispensable, which should be easily handled and conducted without special equipments. Besides, after the recovery, heavy-metal adsorbed materials should be easily conveyed. The authors expect that ionized gels have highly potential applications to the heavy-metal recovery, therefore, have been examining the heavy-metal adsorption ability of several ionized gels and their structural change by the heavy-metal adsorption.

SAXS Observations of a Heavy-Metal Adsorbed Gel

In the present study, the authors have investigated ion absorption effects on a nanostructure of an *N*-isopropyl-acrylamide/sodium acrylate (NIPA/SA) gel.

In order to examine Cu^{II} distribution in the dehydrated Cu^{II}-captured NIPA/SA gel, the authors observed SAXS profiles with changing incident-X-ray energy at BL-10C.

Figure 1 shows incident-X-ray-energy dependence of difference SAXS-profile distribution derived by deducing

a SAXS profile at 9.04 keV (far from the Cu-K absorption edge) from that observed at each incident energy in a range from around 8.90 to 9.06 keV. As can be easily seen, at the energy of the Cu-K absorption edge, the intensity difference takes a minimum around the SAXS peak position. Because the anomalous dispersion effect only occurs by Cu^{II} element, this characteristic feature directly demonstrates a close relation between the Cu^{II} distribution and hydrophilic domain structure. This result indicates a localized distribution of the copper ions in the hydrophilic domain.

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