

Correlation between the Structure of Water in the Vicinity of Zwitterionic Polymers and Their Blood-compatibility

○Hiromi Kitano and Makoto Gemmei-Ide (Grad. Sch. Innovative Life Sci. Ed., Univ. Toyama)

The structure and hydrogen bonding (H-bonding) of water in the vicinity of homo- and copolymers of zwitterionic monomers (vinyllic carboxybetaine, phosphobetaine and sulfobetaine) were analyzed in their aqueous solutions and films with contours of O-H stretching of Raman and attenuated total reflection infrared (ATR-IR) spectra, respectively. The number of H-bonding collapsed by the presence of one monomer residue of zwitterionic homopolymer (N_{corr} value) determined by Raman spectroscopy was much smaller than those for ordinary polyelectrolytes and close to those for nonionic water-soluble polymers such as poly(ethylene glycol). Furthermore, at an early stage of sorption of water, the O-H stretching band of IR spectra for the water incorporated in a film (thickness, ca. 10 μm) of water-insoluble zwitterionic copolymers on a ZnSe crystal was similar to that for free water, which is in contrast with the drastic change in that for water incorporated in polymer films such as poly(*n*-butyl methacrylate) (PBMA). The adhesion of platelets to zwitterionic polymer films was much less than that to PBMA. With an increase in the content of zwitterionic monomer residue, the number of human platelets adhered to the polymer film drastically decreased. These results suggest that the monomer residues with a zwitterionic structure do not significantly disturb the H-bonding between water molecules in both aqueous solution and thin film systems, resulting in the excellent blood-compatibility of the polymers.