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Effect of monomer sequence distribution in poly(vinyl alcohol-*co*-vinyl acetate) on the hydrogen bonding structure and physical properties
SHUN TASAKA, OSAMU URAKAWA, TADASHI INOUE, Department of Macromolecular Science, Graduate School of Science, Osaka University — It has been well known that hydrogen (H-) bonding interaction in polymer materials strongly affects their properties. For example, glass transition temperature (T_g) and terminal relaxation time increase by introducing H-bonding sites. This is because the molecular motion is restricted due to the formation of inter- and intra-chain H-bonds. For H-bonding copolymers in which H-bonding monomer and non-bonding one are incorporated, the fraction dependence of their properties has been examined so far. However, the influence of sequence distribution on their properties has not been studied in detail. In this work, we investigated the H-bonding structure and physical properties of molten poly(vinyl alcohol-*co*-vinyl acetate) with different monomer sequences to clarify the effect of the sequence distribution. We found that, with increasing the randomness in monomer sequences, the number of H-bonds between carbonyl group and hydroxyl (OH) group increased. Moreover, OH groups form linearly connected structure (OH-OH-OH) and its number also increases with the sequence randomness. T_g for the samples with higher sequence randomness are higher than those with lower randomness for high VOH copolymers. These results indicate that formation of larger number of H-bonds makes T_g higher.

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