International Conference on Nanospace Materials 2025@Nagano

Shion Nakamura

Shion Nakamura[1)], Tomohiko Okada[1)]

1) Graduate School of Science and Technology, Shinshu University

E-mail: 25w1046j@shinshu-u.ac.jp (Shion Nakamura), tomohiko@shinshu-u.ac.jp (Tonohiko Okada)

Low temperature dehydrochlorination of poly (vinyl chloride) using zinc (II) stearate

Polyvinyl chloride (PVC) resin is a widely used plastics, however chemical recycling of used PVC resin still faces the problem of emerging HCl gas upon the pyrolysis. Zinc (II) oxide allows elimination of evolving HCl during the dehydrochlorination of PVC, since cross-linking C-C single bond formation among PVC polymer chain by reacting with Zn^{2+}.[1) 2)] The reactions promoters ($ZnCl_2$ and water) spontaneously penetrate the polymer via exothermic reactions. Here, the role of water in the PVC dehydrochlorination was studied using zinc(II) stearate instead of ZnO.

The mixture of PVC with zinc(II) stearate was prepared at a molar Zn/PVC ratio of 1. Exothermic temperature that derived from the dehydrochlorination was 225°C accompanied mass loss due to vaporization of stearic acid. Formation of stearic acid by the PVC dehydrochlorination was confirmed by XRD pattern. The dehydrochlorination was revealed by the absence of C-Cl bond in the FT-IR spectrum. The exothermic temperature was higher than that using ZnO (approximately 200°C). because water, one of the promoter, did not emerge in case of using zinc(II) stearate. Amounts of generated HCl during the dehydrochlorination (2 h) were 5% and < 0.1% for zinc(II) stearate and ZnO, respectively. indicating less ability of HCl capture for zinc(II) stearate compared to ZnO.

1) Kosuda T., et al., *Polym. Degrad. Stab.*, **97**, 584 (2012).

2) Okada T., et al., *Polym. Degrad. Stab.*, **171**, 109040 (2020).