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Application of the products by highly selective photocyclicaromatization of cis-cisoidal poly (substituted phenylacetylene)

We have already reported a petit top-down preparation method for self-supporting supramolecular polymeric membranes by a novel highly selective photocyclicaromatization (SCAT), although supramolecular polymeric materials are usually prepared by bottom-up methods. The SCAT reaction converted π -conjugated polymers from phenylacetylene having two hydroxyl groups to exclusively yield a 1,3,5-trisubstituted benzene derivative whose structures were confirmed by H-NMR, GPC, and TOF-MS. The SCAT reaction had many unique characteristics, such as unusual selectivity, as follows. 1) a quantitative reaction: it gave only the corresponding cyclic trimer, i.e., a 1,3,5-trisubstituted benzene derivative. 2) an intramolecular reaction, 3) a stereospecific and template reaction, 4) a photoreaction, 5) a solid-state reaction. In addition, 6) the resulting cyclic trimers had the ability to form a self-supporting membrane, in spite of their low molecular weights. Since, SCAT has such high selectivity and is useful for the preparation of a self-supporting supramolecular polymer membrane, many kinds of applications can be expected. In this lecture, some applications of the unique reaction products will be presented based on the advantages above mentioned. For example, 1) analysis of the microstructures of the starting polymers, 2) examination of gas permeation through the supramolecular polymers, 3) synthesis of new types of multistranded polymers, and 4) exfoliation of two-dimensional network polymers.

Biography

Toshiki Aoki has received his Bachelor, Master, and Doctorate Degree (1987) in the Department of Applied Chemistry at Nagoya University, Japan. He has joined Fluorine Chemistry Division at Government Industrial Research Institute, Nagoya in 1987–1989. He has moved to Department of Applied Chemistry at Niigata University in 1989 and became a Full Professor (2000). He worked as a Visiting Scientist at University of Southern California in 1998–1999. His research interest covers synthesis of functional polymers, including synthesis of new chiral polymers for permselective membranes. His recent interest is in synthesis and application of two-dimensional polymers using HSSP and SCAT reactions.

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