Tamaki Nakano, Ind Chem 2018, Volume 4
DOI: 10.4172/2469-9764-C1-007

17th International Conference on
Industrial Chemistry and Water Treatment

May 21-22, 2018 | New York, USA

Tamaki Nakano

Hokkaido University, Japan

Chirality induction to polymers and oligomers using circularly polarized light through enantiomer-selective photo excitation

Interactions between substances and light play important roles in life. One of the most important aspects is photosynthesis by plants and other organisms. In photosynthesis, sugars and molecular oxygen are produced from carbon dioxide and water where photon energy drives the reaction. Moreover, in artificial chemical synthesis, light promotes various reactions that are not driven by thermal energy. Further, in reactions where chiral compounds are produced, non-racemic products can be obtained using circularly polarized light (CPL). We recently reported that a preferred-handed helical conformation is induced for a linear polyfluorene derivative (poly (9,9-dioctylfluorene-2,7-diyl [PDOF]) in the solid state when the polymer is irradiated with CPL. The mechanism of this chirality induction involves a twisted-coplanar transition (TCT) of an aromatic–aromatic junction in the polymer where one of the enantiomeric, right- and left-handed twists is preferentially excited into the coplanar conformation. TCT through photo excitation was first predicted for biphenyl through theoretical calculations. In the CPL-driven helix formation of the linear polyfluorene derivative, strong inter-chain interactions were important in effectively induce chirality, which in turn implicates that polymers with weak inter-chain interactions cannot be subjected to the CPL method. This point of the CPL method was overcome using aid molecules which reinforce or simulate inter-chain interaction; a star-shaped fluorene oligomer having only weak inter-chain interactions was successfully made optically active. In addition, photo-transformation of 1,10-bi(2-naphthol) (BINOL) was studied.

Biography

Tamaki Nakano received his BSc (1986), MSc (1988), and PhD (1991) degrees from Osaka University, Japan. He has joined Nagoya University as an Assistant Professor (Prof. Yoshio Okamoto's group) in 1990 and was promoted as Associate Professor in 1998. During his appointment at Nagoya University, he also served as a Visiting Scientist at Cornell University (host: Prof. Dotsevi Y Sogah, 1993–1994). In 1999, he moved to Nara Institute of Science and Technology (NAIST) as an Associate Professor. He was appointed as a Professor of Hokkaido University in 2006 and is currently supervising his research group in Institute for Catalysis.

tamaki.nakano@cat.hokudai.ac.jp

Notes: