バルク物性の光変換に向けた熱安定な分子スイッチを有する高分子の合成と評価

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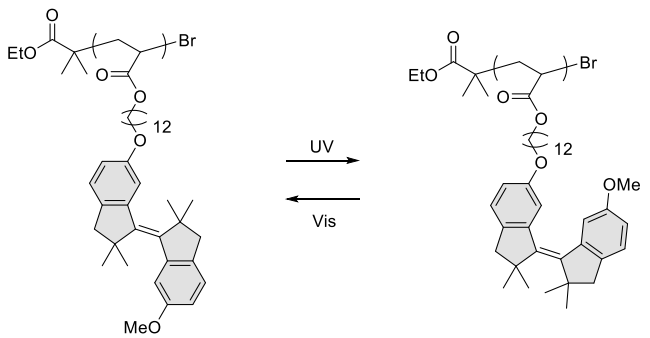
Synthesis and Evaluation of Polymers with Thermally Stable Photoswitches for Photoconversion of Their Bulk Properties ([1]*School of Engineering*, *Hiroshima University*, [2]*Graduate School of Advanced Science and Engineering*, *Hiroshima University*) Taichi Hidaka,[1] Keiichi Imato,[2] Naoki Kaneda,[2] Ichiro Imae,[2] Yousuke Ooyama[2]

Sterically hindered stiff stilbene (HSS) is a new promising photoswitch offering large structural changes, high thermal stability, and high photoisomerization yields.[1)] In our previous study, we synthesized linear polymers with HSS as a repeating unit in the main chains and demonstrated that the glass transition temperatures (T_gs) changed significantly by isomerization of the incorporated HSS. However, the photoisomerization of HSS was inhibited in the bulk probably due to the restricted molecular mobility of the main chains, limiting their applications. Therefore, in this study, we aimed at photoconversion of polymer properties in the bulk by incorporating HSS into side chains, molecular motions of which are less restricted. In this presentation, we will report the synthesis of linear polymers with different alkyl chain lengths at the side-chain end and between the main chain and side-chain HSS, photoisomerization of their spin-coated films, and effects of the photoisomerization on their T_gs.

Keywords: Molecular Switch; Molecular Machine; Photoisomerization; Glass Transition Temperature; Polymer Chemistry

ヒンダードスティッフスチルベン（HSS）は大きな構造変化と高い熱安定性、高い光異性化率を示す新たな分子スイッチである[1)]。過去の研究では、主鎖に HSS を複数導入した直鎖状高分子を合成し、HSS の異性化によりガラス転移温度（T_g）が大きく変化することを見出した。しかし、この高分子のバルク状態では、主鎖の制限された運動性が原因で HSS の光異性化は起こらず、応用は限られた。そこで本研究では、主鎖よりも運動が許された側鎖に HSS を導入することで高分子物性をバルクで光変換することを目的とした。今回、主鎖−側鎖 HSS 間のスペーサーアルキル鎖長と側鎖末端のアルキル鎖長を変えた直鎖状高分子を合成し、スピンコート薄膜の光異性化と光異性化が T_g に及ぼす影響を調査した。



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