TAAC and TEAC, two topochemical reactions for synthesizing crystalline polymers

Kana M. Sureshan
School of Chemistry, IISER Thiruvananthapuram, Maruthamala, Thiruvananthapuram, Kerala-695551, India
kms@iisertvm.ac.in

Keywords: click chemistry, polymer, topochemical reactions, crystal engineering, topochemical polymerization

The properties of solid materials are decided by their molecular packing. Order imparts special properties to materials and polymers are no exception. However the polymer products formed in traditional solution-phase polymer synthesis are usually amorphous in nature. Topochemical reactions, the reaction between pre-organized reacting motifs in the crystal lattice, are attractive as they do not require solvents, catalysts and other special reaction conditions for the reaction and provide products in crystalline form.[1-2] We have employed thermal Topochemical Azide–Alkyne Cycloaddition (TAAC) reaction to synthesize various biopolymer mimics in crystalline form.[3] We have exploited hydrogen bonding for the pre-organization of monomers molecules in an arrangement suitable for their topochemical polymerization reaction. Lattice controlled polymerization reaction of such pre-organized monomers gave various biopolymer mimics.[4-8] Recently, we have developed Topochemical Ene-Azide Cycloaddition (TEAC) reaction for the synthesis triazoline linked polymers.[9] This novel methodology offers regiospecific and stereospecific synthesis of triazolines in the crystal and their facile denitrogenation to aziridines.[10] In this talk, the design and execution of such topochemical syntheses will be discussed.

Figure 1. Schematic representation of TAAC polymerization

References