

Solid-State [2+2] Polymerization of a Bis-Olefinic molecule and luminescence property

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The potential of solid state photochemical [2+2] reactions of a designed molecule has recently been realized in terms of synthesizing novel polymers with functional properties. These reactions are important not only for their high yields and stereoselectivity, but also their environment friendliness and accessibility of materials which otherwise cannot be synthesized using conventional synthetic methodologies. In polymer chemistry, solid state photochemical reactions have drawn a special attention given their potential applications as electro-chemical switches, electric devices, sensors and so forth as well as fluorescence property is an important aspect given their applications. In our present study, the structural integrity of a designed bis-olefin containing bis-amide molecule, its reactivity towards solid state [2+2] photo-polymerization reaction and luminescence properties have been demonstrated. Crystal structure analysis reveals that it forms a doubly interpenetrated 3D-diamondoid type network via amide•••amide hydrogen bonding. Between the doubly interpenetrated network, olefinic double bonds are aligned which fulfills the Schmidt's criteria for solid state [2+2] photochemical reaction. The formation of photo-polymerized product has been characterized by ¹H-NMR and MALDI-TOF analyses. The polymerized product shows a red shifted emission spectrum as compared to bis-olefin containing molecule.

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