1,2-Dithiolanes as Building Blocks to Intrinsically High Refractive Index Polymers

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With the pursuit advances in optical devices the need for high refractive index, high thermal stability, high transparency, and low birefringence polymers have increased substantially. A typical strategy to develop high refractive index polymers is the incorporation of high molar fraction groups such as sulfur, phosphorous, bromine, iodine and/or aromatic structures. Due to its high polarizability, high stability, and straightforward insertion in its molecular structure sulfur is one of the elements most commonly use to increase the refractive index of polymers. A particular class of sulfur-containing molecules 1,2-dithiolanes, which contain a saturated five-membered disulfide ring, shown remarkable potential for the development of intrinsically high refractive index polymers with low volumetric shrinkage, due to its ability to participate in a variety of radical and ionic ring opening reactions yielding thiolate or sulfur-centered radicals each of which can initiate ring opening oligomerization or polymerization with another cyclic disulfide producing disulfide-rich backbone of poly(dithiolane)s.[1,2] Among the 1,2-dithiolanes molecules, lipoic and asparagusic acid (natural occurring molecules) are perhaps the best-known members of this group. The ring opening reaction of 1,2 dithiolanes occur via both thermally and light mediated polymerizations even in the absence of initiator.[3] In this paper, we present a new framework for the preparation of intrinsically high refractive index (HRIPs).

References:

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