

SYNTHESIS AND APPLICATION OF PHOTOCROMIC POLYMERS

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Photochromic materials change their color in response to exposure of light of appropriate wavelength. They are bleached by exposure to longwave visible or infrared radiation. Such photochromism is usually based on reversible structural changes of molecules on irradiation. This reversibility of the color change requires no processing for development and has steadily gained increasing interest as a tool to photochemically control various phenomena. In particular reversible change in refractive index accompanied by the changes in color has become one of the important methods to achieve erasable recording and all optical modulation of signal light. Such refractive index change from photochromic materials needs no mechanical nor electronic assistance. Thus various types of all optical devices based on photochromic materials have been studied for all-optical switch, 2×2 switch, an integrated optical interferometer, a photorecordable and rewritable channel waveguide, and an all-optical 1×2 Y-branch switch. The important issues for the application of photochromic materials in these devices are thermal stability, response time, and degree of refractive index change.

In this presentation we report preparation and application potential of photochromic polymers. As a photochromic polymer, we have investigated a diarylethene polymer, in which diarylethene molecules are doped in polymer matrix or attached to polymer chains by covalent bonding. The photochromic polymers were fabricated into a solid phase films by solution casting, radiation curing, and vacuum deposition methods, for various application such as optical recording and switching devices. In particular we report far field, near field, and holographic recording properties using the diarylethene containing films.

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