California State University | CHEMISTRY CHANNEL ISLANDS

CHEMISTRY SEMINAR

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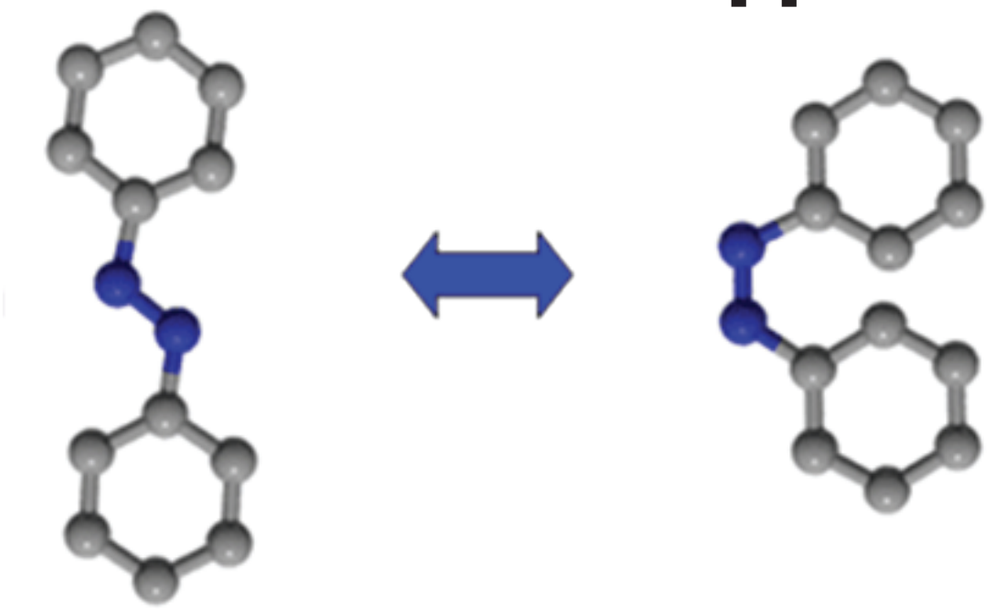
Light-Responsive Materials for Potential Biomedical Applications



Aliso Hall
Room 150

1PM, Friday
October 19,
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Free & open
to the public

ABSTRACT:

Smart materials are materials that change in shape, color, or other material property in response to an external stimulus. When the stimulus is light and the response is a shape change, we call the material photo-responsive. Light is an attractive trigger, because it gives the potential for remote steering of the material with applications that include micromachines and minimally invasive surgical instruments. Liquid crystal elastomers (LCEs) couple the elasticity and mechanical strength of polymers to the long range order inherent to liquid crystals in a single material. Long range order gives the material the ability to rapidly amplify and transduce signals at the surfaces into the bulk of the LCE, while elasticity enables the material to return to its original position after the stimulus is removed, making the behavior repeatable. We synthesized a visible-light responsive LCE made by adapting a literature procedure for two stage crosslinking to include a reactive azobenzene dye, which isomerizes from a linear trans isomer to a bent cis isomer in the presence of visible light. Incorporating this dye covalently into an LCE enabled the microscopic cis-trans isomerism to be amplified to a macroscopic deformation of the whole material in the presence of visible light. Covalent bonding of azobenzene dye to the LCE was confirmed using solvent leaching and UV/Vis spectroscopy. We demonstrated reversible photo-response using 450 nm and 532 nm laser pointers (100mW to ~5W).

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