The Optimization of Photo-Actuated Liquid Crystalline Elastomers Through the Engineering and Design Cycle

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Of the current forms of renewable energy, solar energy holds the most promise for overtaking carbon-based methods. Although cost competitive, most commercial solar panels turn sunlight into energy with an efficiency of 20% or less. When used as the supporting beams for solar panels, photo-actuated liquid crystalline elastomers can improve the overall efficiency. The polymers on the side closest to the sun contract, tilting the solar panel towards the sun and increasing the number of light rays which strike the photovoltaic cell. Improvements in the functionality of these polymers will lead to an increase in solar energy harvesting. The points of optimization explored by this project will be in the material’s composition, synthesis process, and final shape/structure. By proceeding through multiple iterations of the engineering and design cycle, this project improved the synthesis of photo-actuated liquid crystalline elastomers, however, there is still much to explore.

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