

## **Capture and Storage of Solar Radiation**

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## Abstract

The Sun delivers within an hour to Earth an amount of energy similar to that consumed by all humans in one year. One major challenge for society is to be able to store solar energy.

Our fundamental hypothesis is that we can store energy in chemical bonds via lightinduced isomerization reactions of photoactive molecules as illustrated in Fig. 1. Upon irradiation, molecule A is converted to the high-energy photo-isomer B, which upon a certain trigger will return to A and release the absorbed energy as heat. This corresponds to a closed-energy cycle of light-harvesting, energy storage and release, with no emission of  $CO_2$ . The overall purpose of this project is to develop suitable organic molecules for such cycles based on fundamental structure-property relationships (SPRs).

We will focus on the dihydroazulene (DHA) – vinylheptafulvene (VHF) couple (Fig. 2), being attractive as only the DHA to VHF reaction is photoinduced.



Fig. 1: Energy storage using photoswitch.



Fig. 2: DHA-VHF couple and numbering.