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Photoswichable Molecular Rings for Solar-Thermal Energy Storage ENGIN DURGUN, ALEXIE M. KOLPAK, JEFFREY C. GROSSMAN, Massachusetts Institute of Technology — Solar-thermal fuels reversibly store solar energy in the chemical bonds of molecules by photoconversion, and can release this stored energy in the form of heat upon activation. Many conventional photoswichable molecules could be considered as solar thermal fuels, although they suffer from low energy density and short lifetime in the photo-excited state, rendering their practical use unfeasible. We present a new approach to design systems for solar thermal fuel applications, wherein well-known photoswitchable molecules are connected by different linker agents to form molecular rings. This approach allows for a significant increase in both the amount of stored energy per molecule and the stability of the fuels. Our results suggest a range of possibilities for tuning the energy density and thermal stability as a function of the type of the photoswitchable molecule, the ring size, and/or the type of linkers.

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