

Altering the Properties of Spiropyran Switches Using Coordination Cages with Different Symmetries

Autorzy

Jinhua Wang

Liat Avram

Yael Diskin-Posner

Michał J. Białek

Wojciech Stawski

Moran Feller

Rafał Klajn

Rok wydania

2022

Czasopismo

Journal of the American
Chemical Society

Numer woluminu

144

Strony

21244-21254

DOI

10.1021/jacs.2c08901

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Molecular confinement effects can profoundly alter the physicochemical properties of the confined species. A plethora of organic molecules were encapsulated within the cavities of supramolecular hosts, and the impact of the cavity size and polarity was widely investigated. However, the extent to which the properties of the confined guests can be affected by the symmetry of the cage—which dictates the shape of the cavity—remains to be understood. Here we show that cage symmetry has a dramatic effect on the equilibrium between two isomers of the encapsulated spiropyran guests. Working with two Pd-based coordination cages featuring similarly sized but differently shaped hydrophobic cavities, we found a highly selective stabilization of the isomer whose shape matches that of the cavity of the cage. A T_d -symmetric cage stabilized the spiropyrans' colorless form and rendered them photochemically inert. In contrast, a D_{2h} -symmetric cage favored the colored isomer, while maintaining reversible photoswitching between the two states of the encapsulated spiropyrans. We also show that the switching kinetics strongly depend on the substitution pattern on the spiropyran scaffold. This finding was used to fabricate a time-sensitive information storage medium with tunable lifetimes of the encoded messages.

Słowa kluczowe

Cavities, Encapsulation, Light, Molecular structure, Nuclear magnetic resonance spectroscopy

Licencja otwartego dostępu

CC-BY

Licencja na prawach której można swobodnie kopiować, rozprowadzać, zmieniać i remiksować objęty prawem autorskim utwór (Utwór-przedmiot prawa autorskiego) pod warunkiem podania imienia i nazwiska autora utworu pierwotnego oraz źródła pochodzenia utworu.

Pełny tekst licencji:

<https://creativecommons.org/licenses/by/3.0/pl/legalcode>

Adres publiczny

<http://dx.doi.org/10.1021/jacs.2c08901>

Strona internetowa wydawcy

<https://www.acs.org/content/acs/en.html>