

# Light-Switchable Cucurbituril Host-Guest Complexes in Water

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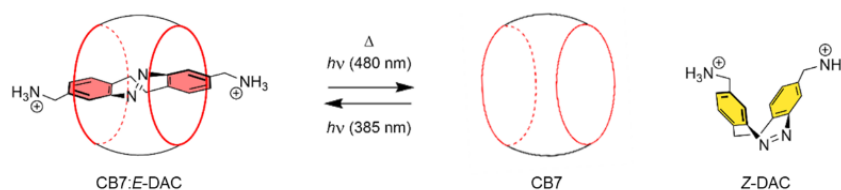
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The development of drug delivery devices or advanced molecular machines demands a profound knowledge of its potential building blocks. Therefore, it is imperative to have highly advantageous capabilities available in such components. Our work is focused on photoswitchable host-guest systems in water. They are based on the synthetic macrocycles called cucurbit[n]urils (CBn, in this work n = 7 or 8) as hosts and guests such as dithienylethenes (DTE) or diazocines (DAC).

The DAC are azobenzene derivatives with an additional bridge linking the phenyl rings. Therefore, unlike what usually happens, the most stable isomers are the *Z*-DAC. We studied the complexation between a water-soluble DAC derivative with CBn hosts [1]. The CB7 host binds selectively the *E*-isomer with a micromolar affinity (figure 1). Furthermore, CB8 bind strongly both isomers, but prefers the *Z*-isomer, as it forms a tighter complex. The photochemical conversion of DAC from *Z* to *E* isomer is mainly unaffected by CBn complexations, but the thermal recovery rates were found to be accelerated by these hosts. This effect is remarkable in the presence of CB7, that acts as a supramolecular catalyst in a system comparable to Michaelis-Menten enzymes.

As for the DTE guests, its photochemical properties allow control over the CB8 complexation affinity and kinetics with red or near infrared light, converting the colored ring-closed isomers into their fluorescent open forms [2]. The association constants of these 1:1 complexes range from micro to picomolar affinity, being higher for the closed isomers (up to 10000-fold) [3]. Therefore, they can be applied to catch and release biologically relevant guests through competitive binding.



**Figure 1.** CB7 selectively binds the *E*-DAC and acts as a photoresponsive host-guest pair.

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## References

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