Development of Two-Photon Stepwise Photochromism

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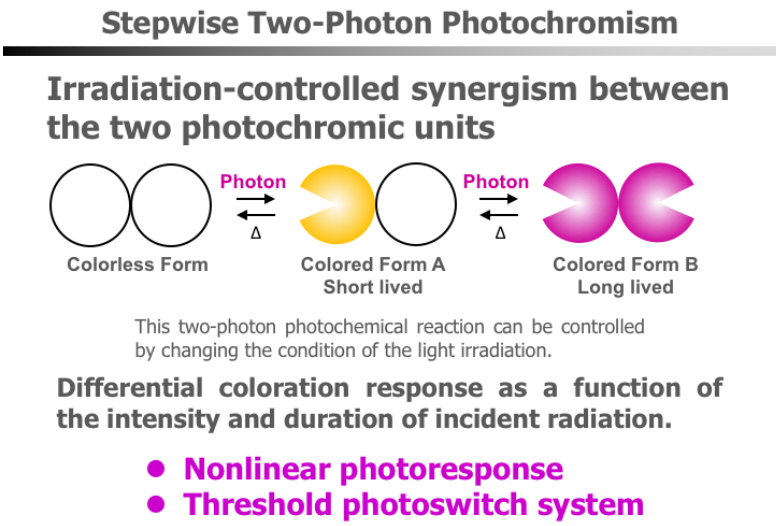
The cooperative interaction between photons and molecules, recently termed as "photosynergetic" effect, is crucial to develop advanced photofunctional materials beyond a one-photon reaction of a single chromophore.[1] The two-photon absorption is one of the attractive processes for the efficient utilization of photons. Especially, the nonlinear response of the two-photon absorption process is of interest not only to realize temporal and spatial control of reactions but also to develop the rewritable optical memory media and smart optical devices responding to intensity of light. The stepwise two-photon induced photochromism, which involves a short-lived transient species as an intermediate state[2-5], is one of the advanced photo-responsive compounds. The key feature of the stepwise two-photon induced photochromism is an effective electronic interaction between the photogenerated transient chromophores.

In this contribution, I will present the recent progress of the fast T-type photochromic molecules involving the stepwise two-photon absorption processes. While high power pulse lasers were necessary to induce conventional simultaneous and stepwise two-photon absorption processes, the stepwise two-photon absorption process with the fast photochromic compound can be initiated by extremely weak continuous wave light. The basic concept and future outlook of the fast photochromism involving the stepwise two-photon absorption process will be discussed.[6-10]



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