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Photoisomerization of azobenzene derivative combined liposome using a two-photon UV–Blue pulsed laser

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1. Introduction

Azobenzene-based photo devices have attracted ongoing interest for applications in controlled drug release since the first report by Kano et al. in the early 1980s.[1, 2] However, the poor penetration of UV light which is necessary for chemical structure change of azobenzene limits the *in vivo* application of azobenzene. In this study, a broadly tunable pulsed laser with a tuning range from the UV to blue region was developed and used for conformational change of the azobenzene derivative.

2. Materials & Methods

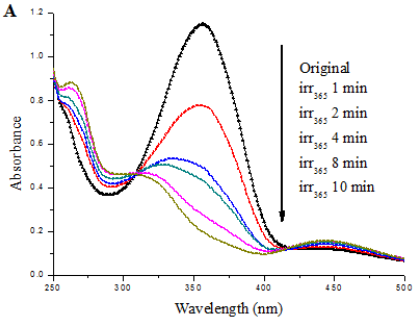
The azobenzene derivative CAB was synthesized as described before.[3] The preparation of liposomes was carried out using the standard sonication method.[4] The UV spectrum as a function of irradiation time was measured using a UV-Vis spectrophotometer. Figure 1 shows the chemical structure of CAB and the schematic illustration of the CAB- liposome.

Figure 1 Schematic illustration of the azobenzene derivative combined liposome.

3. Results

3.1. Photoisomerization in $CHCl_3$

The azobenzene derivative CAB exhibited rapid reversible *trans-cis* isomerization under UV or visible light irradiation (Fig. 2).



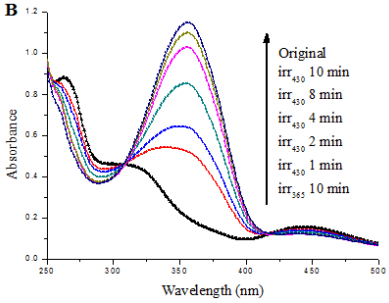


Figure 2 UV-Visible spectral changes of CAB in $CHCl_3$ following: A, 365 nm laser irradiation for different durations and B, 365 nm irradiation for 10 min followed by 430 nm irradiation for different durations.

3.2. Photoisomerization in liposome

Trans-to-*cis* photoisomerization was observed for CAB-liposome under laser irradiation at 365 nm (Fig. 3). The rate of isomerization was much lower in the liposomes than in $CHCl_3$ solution for the constrain of liposome membranes. The results indicated that photocontrolled drug release from CAB-liposomes could be achieved.

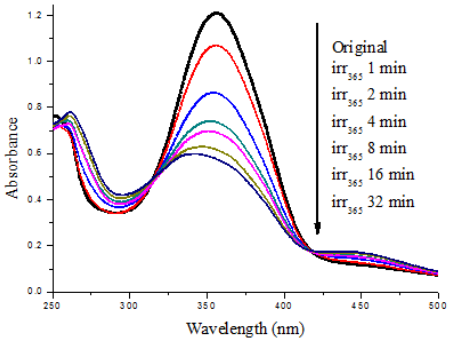


Figure 3 UV-Visible spectral changes of CAB in liposome following 365 nm laser irradiation for different durations.

3. Conclusions

Reversible *trans-cis* isomerization of CAB can be well realized both in $CHCl_3$ and liposome under the two-photon UV–Blue pulsed laser.

References

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