Supporting Information

Anomalous pressure effects on the photoreaction of a light-sensor protein from *Synechocystis*, SyPixD, and the compressibility change of its intermediates

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SI-1. TG signals of SyPixD at 0.1 MPa at various excitation laser intensities

Typical TG signals of SyPixD in the wide time region from sub-microseconds to seconds measured at 0.1 MPa are shown in Fig.SI-1. The reaction features depend on the light intensity. At a weak light intensity such that only one monomer unit is excited, the signal consisted of the thermal grating component, the volume contraction process reflecting a confrontation change, and protein diffusion component. Since the temporal profile of the diffusion signal was well reproduced by a single exponential function, it was concluded that the diffusion coefficient does not change by the reaction. However, when the excitation light intensity was increased, a new diffusion component appeared beside the original diffusion component and the diffusing species was attributed to the dimer of SyPixD. A detailed analysis of the power dependence indicates that the decamer dissociates into the dimer by the photoexcitation of two monomer units among the decamer, but it does not dissociate by the photoexcitation of the one monomer unit.

Detailed analysis and features of this TG signal has been described elsewhere.[1]

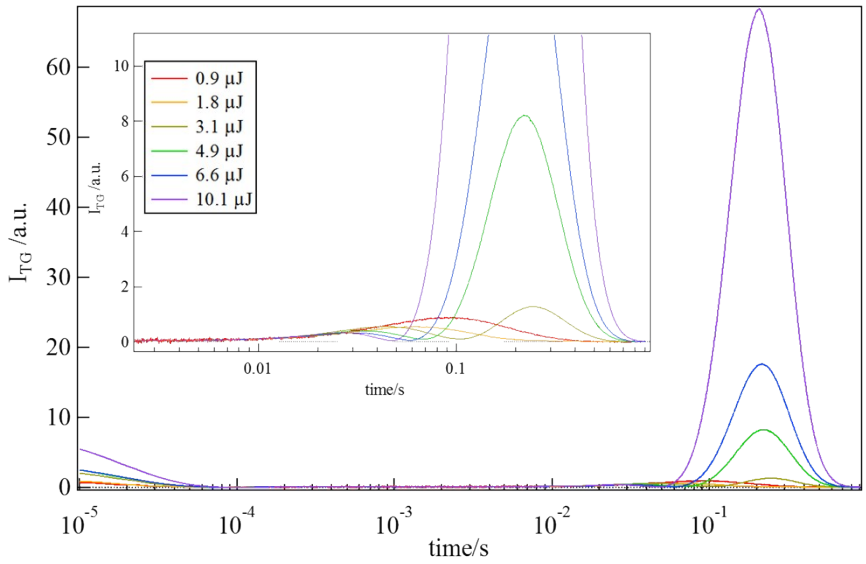
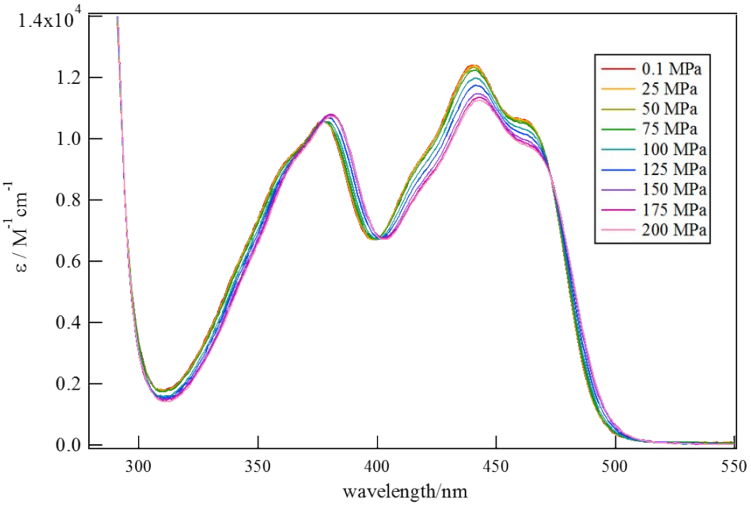


Fig.SI-1

Typical TG signals after photoexcitation of SyPixD at 0.1 MPa and at various excitation light intensities. The laser powers are indicated in the legend.

SI-2 Pressure effect on the UV-Vis absorption spectra corrected to the increase in density.



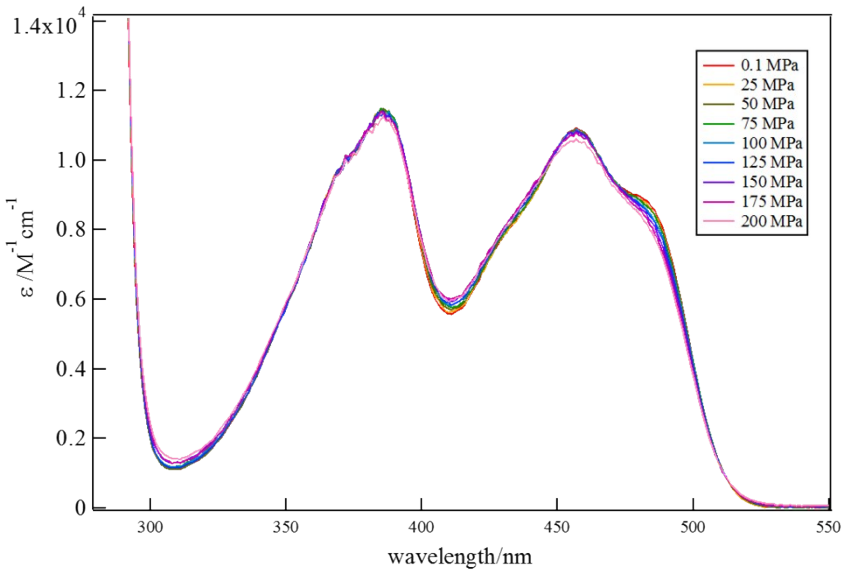


Fig.SI-2

UV-Vis absorption spectra measured at various pressures (a) in the dark and (b) after the light illumination. The spectra are corrected to the increase in density. The pressures are indicated in the legend.

SI-3 CD spectra of SyPixD before and after the application of high pressure

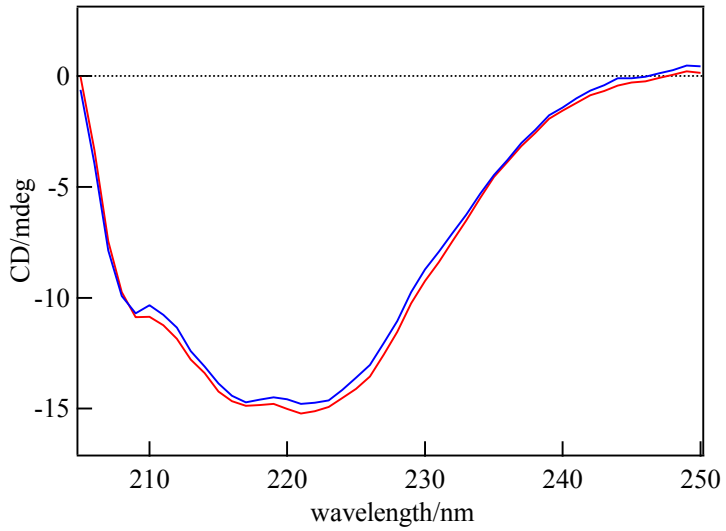


Fig.SI-3

CD spectra of SyPixD before (blue curve) and after (red curve) the application of high pressure (200 MPa). The sample solution was placed in a high-pressure condition for 30 minutes and measured the CD spectrum at 0.1 MPa.

SI-4 The diffusion coefficient of SyPixD determined by the DLS measurement.

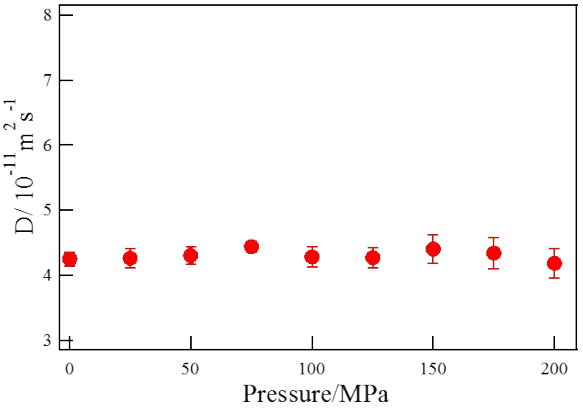


Fig.SI-4

The diffusion coefficient of SyPixD at various pressures determined by the DLS measurement.

References

1. K. Tanaka, Y. Nakasone, K. Okajima, M. Ikeuchi, S. Tokutomi and M. Terazima, *J. Mol. Biol.*, 2011, **409**, 773-785.