

## Supplementary information

**Haruki Nagakawa,<sup>a,b</sup> Ayano Takeuchi,<sup>a</sup> Yuya Takekuma,<sup>a,b</sup> Tomoyasu Noji,<sup>c</sup> Keisuke Kawakami,<sup>c</sup> Nobuo Kamiya,<sup>c</sup> Mamoru Nango,<sup>c</sup> Rei Furukawa,<sup>d</sup> and Morio Nagata<sup>\*a</sup>**

- a. Department of Industrial Chemistry, Graduate School of Engineering, Tokyo University of Science, 12-1 Ichigayafunagawara-cho, Shinjuku-ku, Tokyo, 162-0826, Japan.  
E-mail: 4218533@ed.tus.ac.jp; 4218528@ed.tus.ac.jp; 4218701@ed.tus.ac.jp; nagata@ci.kagu.tus.ac.jp
- b. Photocatalyst Group, Research and Development Department, Local Independent Administrative Agency Kanagawa Institute of industrial Science and TEChnology (KISTEC), Japan.  
E-mail: haruki.nagakawa@gmail.com
- c. The OCU Advanced Research Institute for Natural Science & Technology (OCARINA), Osaka City University, 3-3-138 Sugimoto, Sumiyoshi-ku, Osaka 558-8585, Japan.  
E-mail: tnoji@ocarina.osaka-cu.ac.jp; keikawa@sci.osaka-cu.ac.jp; nkamiya@sci.osaka-cu.ac.jp; nango@ocarina.osaka-cu.ac.jp
- d. The University of Electro-Communications, Chofugaoka 1-5-1, Chofu, Tokyo 182-8585, Japan.  
E-mail: furukawa@ee.uec.ac.jp

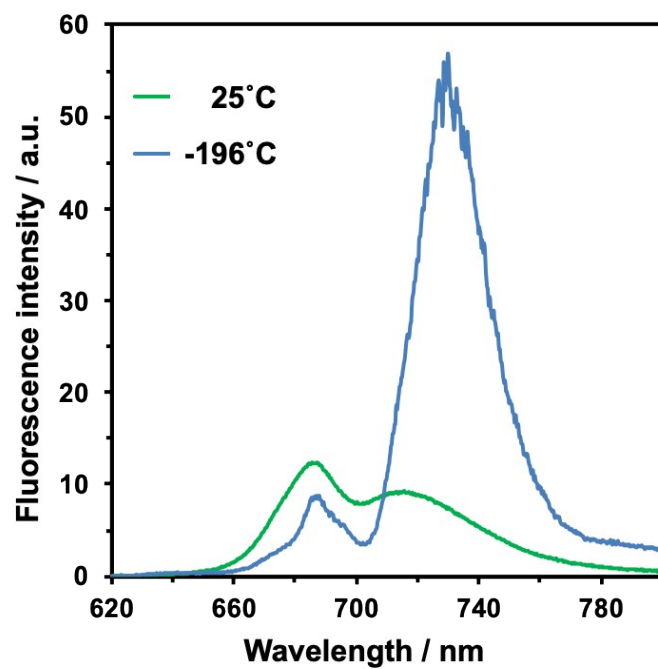


Fig. S1. Fluorescence emission spectra of PSI solution at room temperature (25 °C) and low temperature (-196 °C).

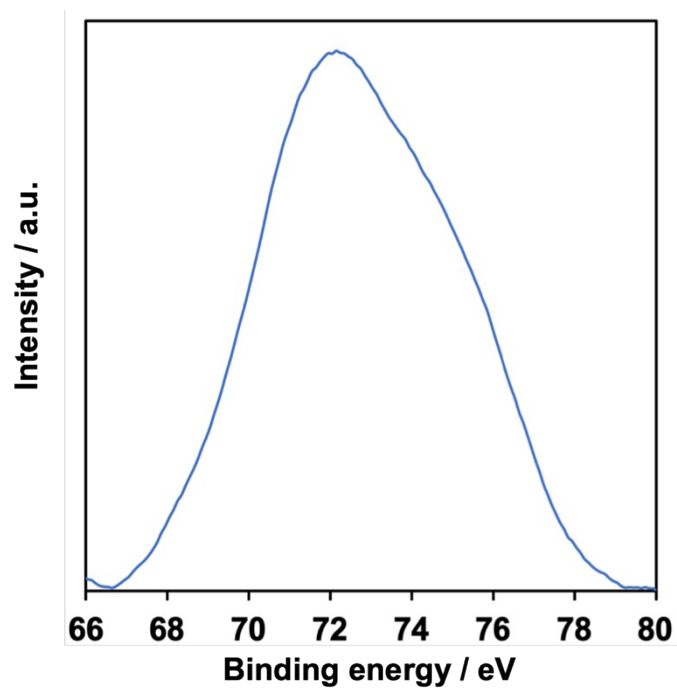


Fig. S2. XPS platinum peak obtained from the prepared PtNP. (JPS- 9010MC, Mg anode, JEOL Ltd., Tokyo, Japan)

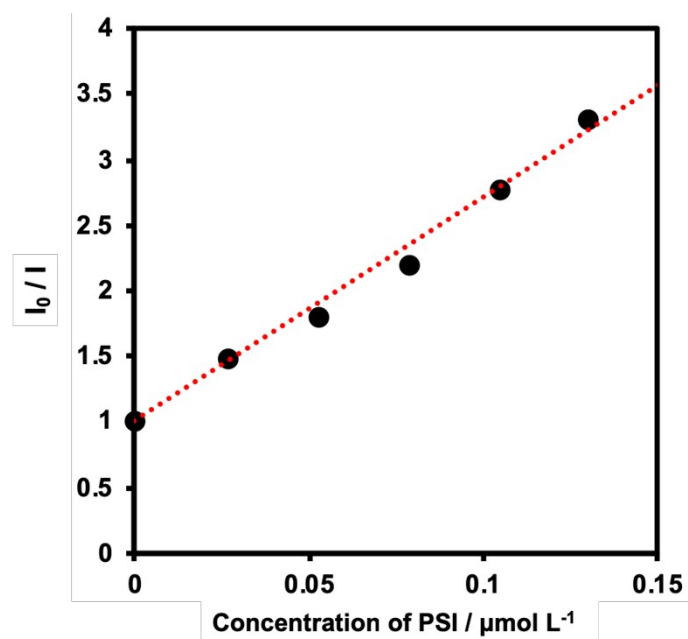


Fig. S3. Stern-Volmer plot for fluorescence quenching of LR at different concentrations of PSI at 25 °C. Concentrations: [LR] = 6.67  $\mu\text{M}$ , [PSI] = 0, 0.0263, 0.0525, 0.0785, 0.1043, 0.1300  $\mu\text{M}$  (adding 2.04 mg chlorophyll  $\text{mL}^{-1}$  from 10 to 50  $\mu\text{L}$ ).  $K_{SV} = 17.03$ , R-squared value = 0.9898.