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SUPPORTING INFORMATION

Enhanced Photostability of Chlorophyll-*a* using Gold Nanoparticles as Efficient Photoprotector

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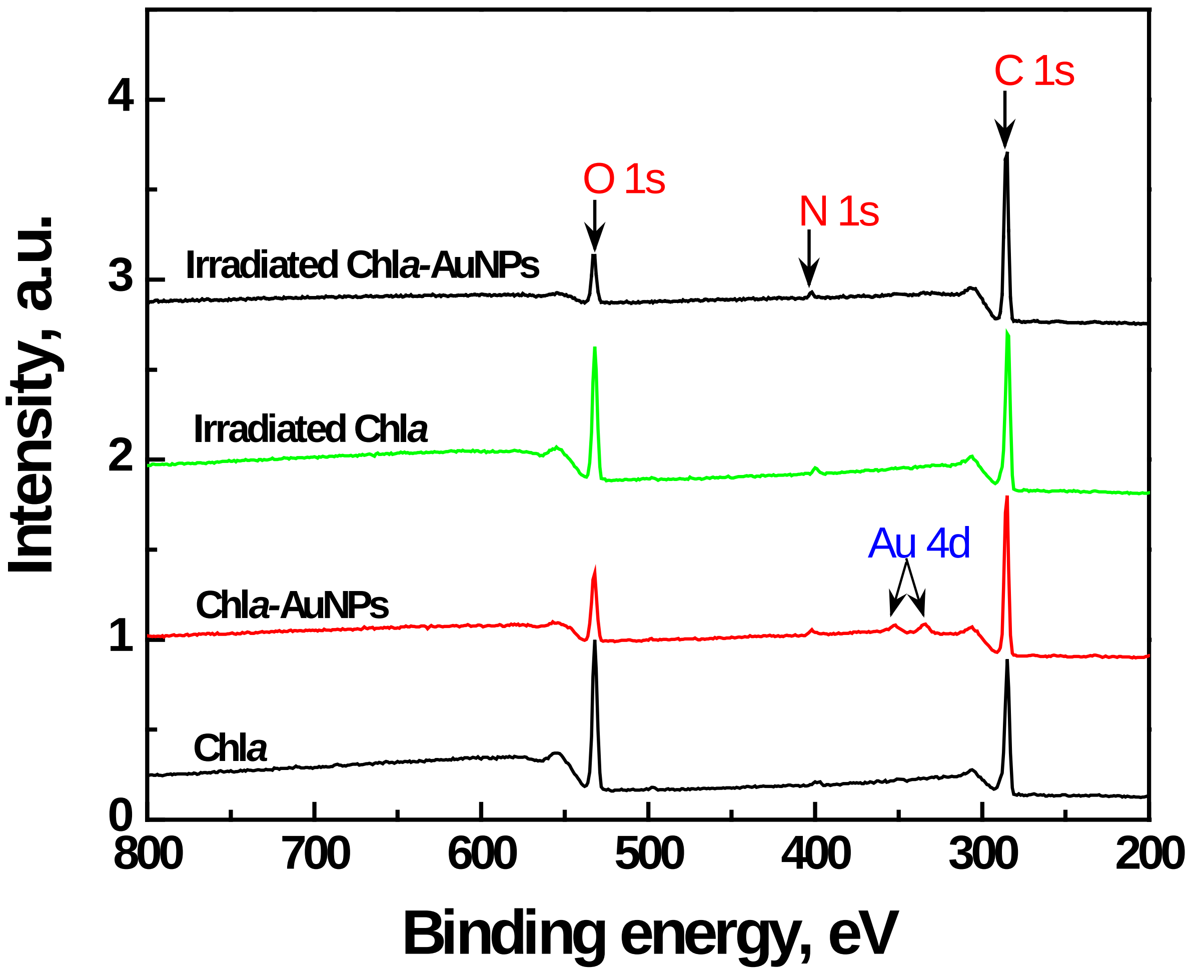

Fig. S-1 XPS survey spectra of Chl*a*, Chl*a*-AuNPs, irradiated Chl*a* and irradiated Chl*a*-AuNPs.

High-resolution C1s and N1s XPS spectra for gold nanoparticles (AuNPs) are shown in Fig.S-2 and S-3, respectively. The C1s region of AuNPs comprises three distinct peaks. The peak appearing at 285 eV, is assigned to C-C and C-H from tetraoctylammonium bromide (TOAB), the stabilizing agent used in the preparation of AuNPs. The second peak at 286.07 eV is ascribed to C-N of quaternary amine from TOAB, while a smaller peak at higher binding energy (287.17 eV) is probably due to an impurity.

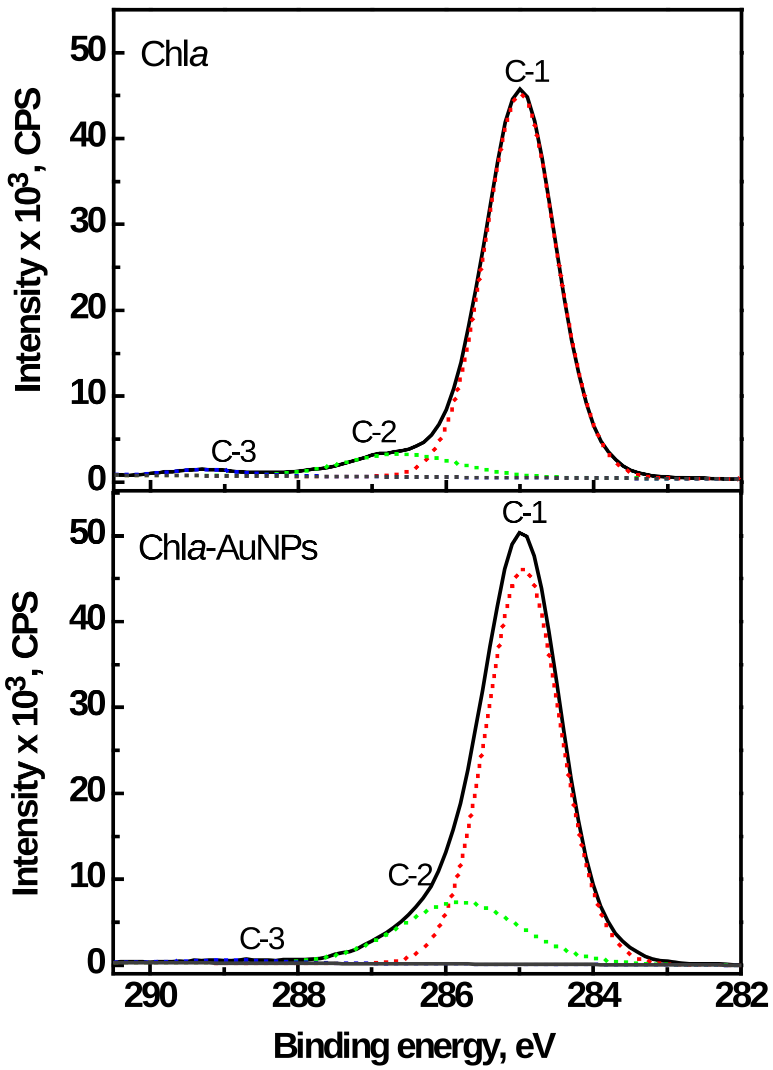

Fig. S-2 C 1s narrow scan XPS spectra for Chl*a* and Chl*a*-AuNPs.

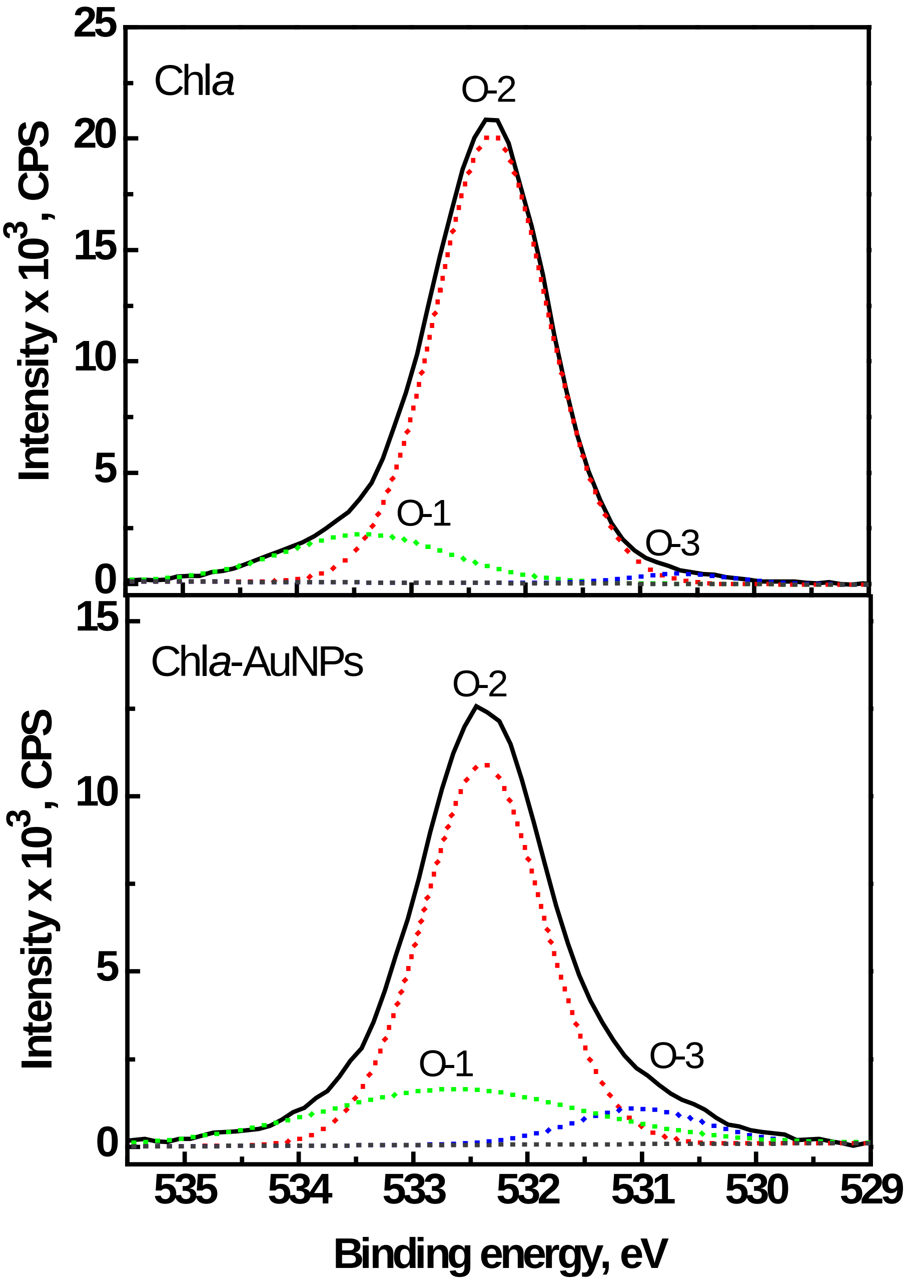

Fig. S-3 O 1s narrow scan XPS spectra for Chl*a* and Chl*a*-AuNPs.

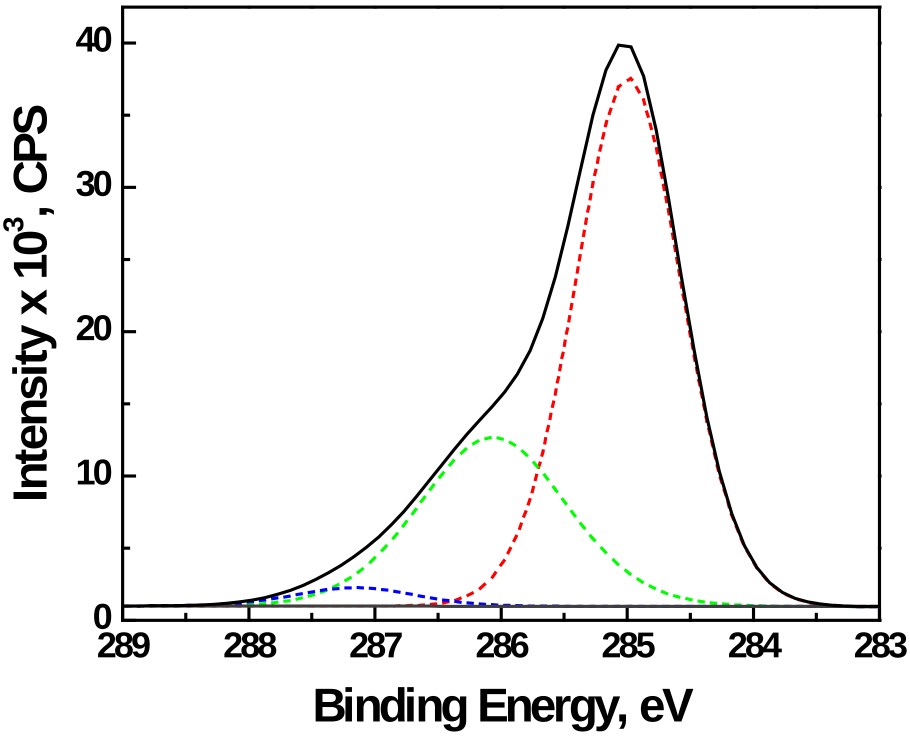

Fig. S-4 C1s narrow scan XPS spectrum for AuNPs.

Kinetics of Photochemical reaction

The photodegradation of Chl*a* in presence of O_2 can be described by following equation

$$Chla + O_2 \xrightarrow{h\nu} Chla(O_2) \qquad (1)$$

The photodegradation rate of Chl*a* was monitored by recording the absorbance at 665 nm as a function of irradiation time, and is:

$$-\frac{d[Chla]}{dt} = k[Chla]*[O_2] \qquad (2)$$

Where [Chl*a*] denotes the concentration of Chl*a*, [O_2] denotes the concentration of O_2, *t* is the reaction time, and *k* is the rate constant. As the [O_2] remains constant as the reaction proceeds, the reaction can be considered pseudo-first-order because it depends on the concentration of [Chl*a*] only.

Thus, eq. (2) can be written as follows:

$$-\frac{d[Chla]}{dt} = k'[Chla] \qquad (3)$$

where $k' = k[O_2]$

Solving eq. (3), one obtains eq. (4)

$$\ln([Chla]_t) = -k't + \ln([Chla]_0) \qquad (4)$$

Where [Chl*a*]$_0$ is the initial concentration of Chl*a* and [Chl*a*]$_t$ is the concentration of Chl*a* at any time *t*. A plot of $\ln([Chla]_t)\ \upsilon s\ t$ should yield a straight line with a slope of *k*'; a typical plot is shown in the inset of Fig. 4.