Supporting Information

for

# DNA Hydrogel as a Template for Synthesis of Ultrasmall Gold Nanoparticles for Catalytic Applications

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## 1. PicoGreen fluorescent protocol for determination of double-helix DNA contents in DNA hydrogel

PicoGreen (Molecular Probes) fluorescence intensity is greatly enhanced in solution of double-stranded DNA but not single-stranded DNA. Comparison of PicoGreen fluorescence intensities in solutions with DNA before (DNA stock solution) and after cross-linking (DNA hydrogel after sonication) (Figure S1) shows that DNA from hydrogel contains a very little amount of double-stranded DNA.

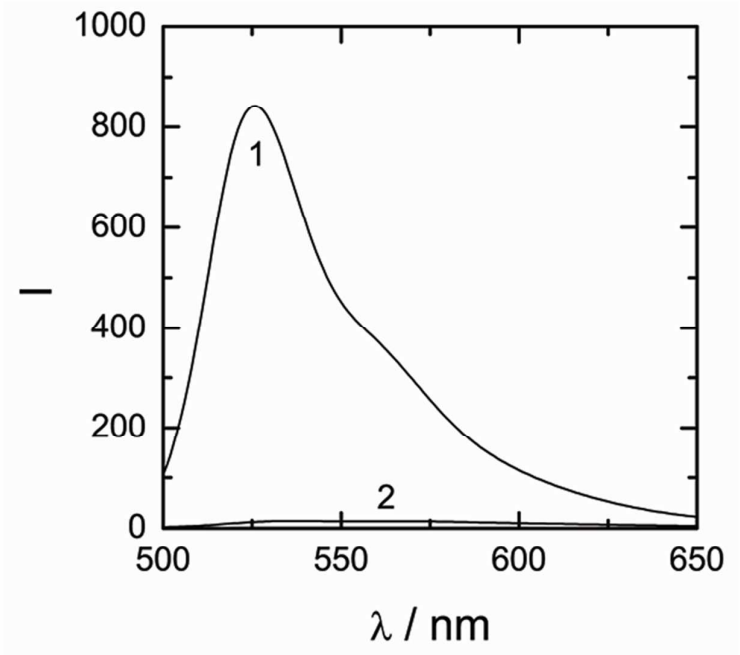


**Figure S1.** Fluorescence spectra of PicoGreen under 485 nm excitation in 1 μg/mL DNA solutions obtained by dilution of either original salmon sperm DNA (1) used for gel preparation or sonicated DNA hydrogel film (2).

## 2. Time-dependent changes of UV-vis spectra in a course of preparation of Au NP in DNA hydrogel

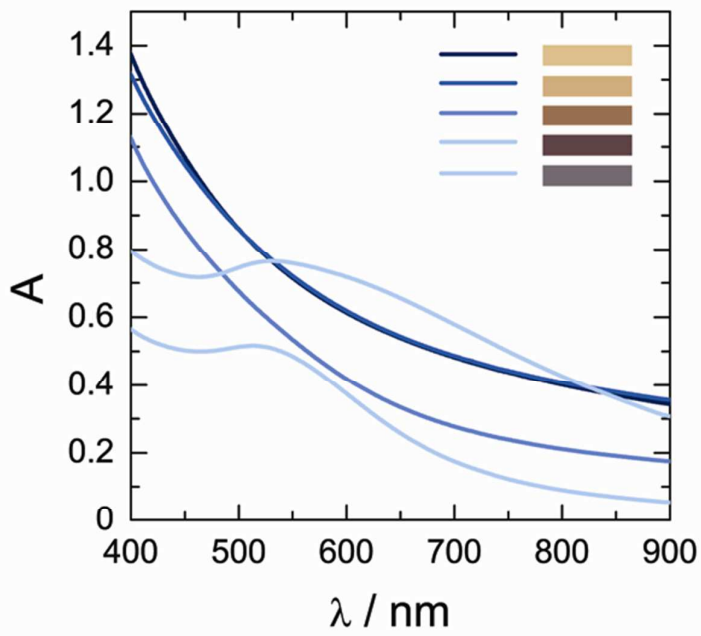


**Figure S2**. Time resolved UV-vis spectral changes of DNA hydrogel containing Au(III) after addition of NaBH4 reduction agent as described in the Experimental Part. Pieces of the DNA hydrogel with similar size were removed from a solution of a reduction agent, placed in a MilliQ water, sonicated no longer than 1 min, and measured by UV-vis spectroscopy. Due to the difference in the amount of sonicated DNA hydrogel and the degree of DNA hydrogel degradation during sonication, the absorbance inequities on the spectra are not adjusted to correspond to the same amount of Au(III), yet can be compared qualitatively. The approximate colors of the corresponding solutions after sonication are indicated in the legend (top-right).

### 3. UV-vis spectra of hybrid DNA hydrogel film as-prepared

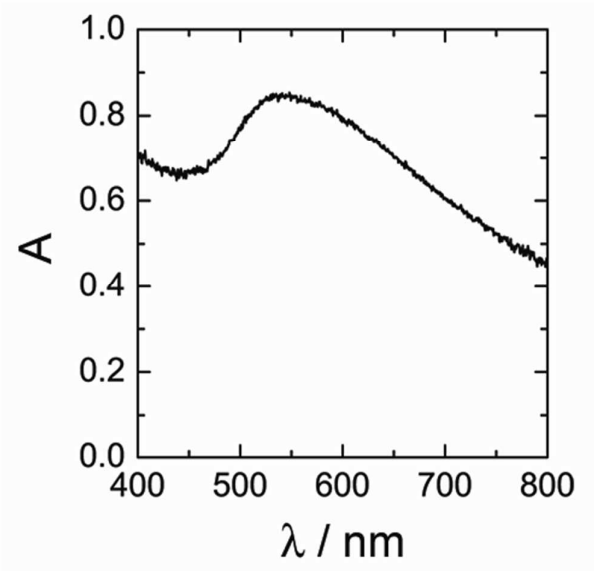


**Figure S3.** UV-vis spectra of DNA hybrid hydrogel films obtained by reduction of Au(III) inside DNA hydrogel matrix by $NaBH_4$ and observed by placing the hydrogel between two glass plates (0.3×40×15 mm, Matsunami, Japan) and setting it up perpendicularly to the direction of light beam propagation in spectrometer (Jasco V-630 (Japan)).

**4. TEM image and size distributions of gold nanoparticles obtained in concentrated DNA solutions.**

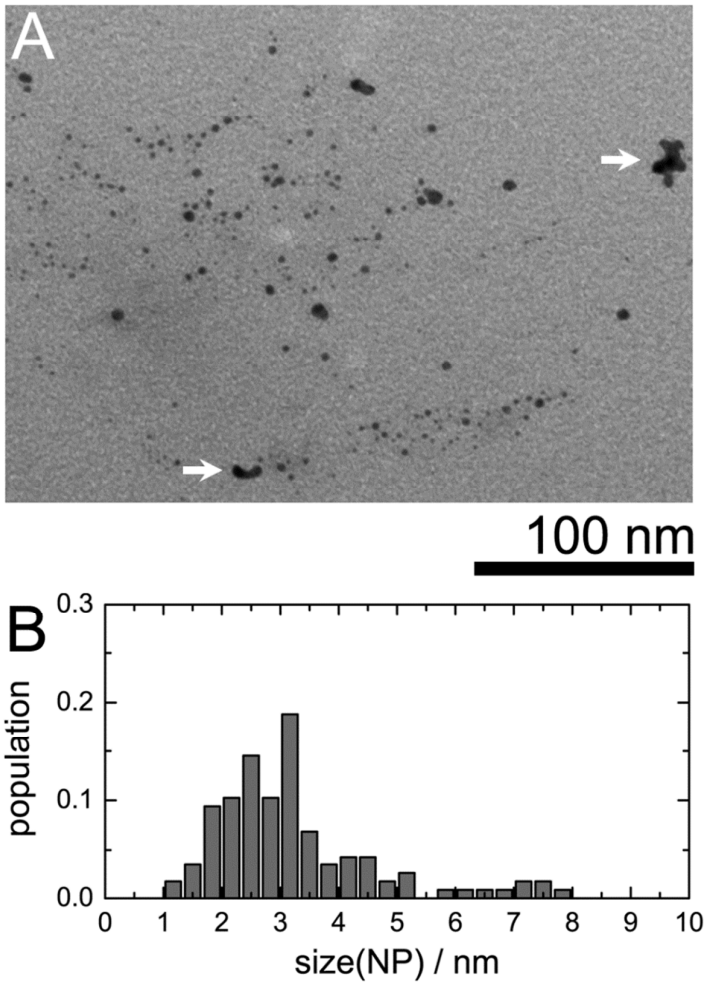


**Figure S4.** A. Typical TEM micrograph of Au nanopartilces prepared in concentrated (30 mM) salmon sperm DNA solutions by adding 4 mM $HAuCl_4$, incubation for 6 hours, and reduction by 10 mM $NaBH_4$. B. Statistical distributions of gold nanoparticles' diameter measured from TEM micrograph. The large non-spherical aggregates, such as those indicated by white arrows, were not measured for