

## **Supporting Information**

### **Gel Electrophoretic Analysis of Differently Shaped Interacting and Non-interacting Bioconjugated Nanoparticles**

Suhee Kim<sup>†</sup>, Alastair W. Wark<sup>‡</sup> and Hye Jin Lee<sup>†\*</sup>

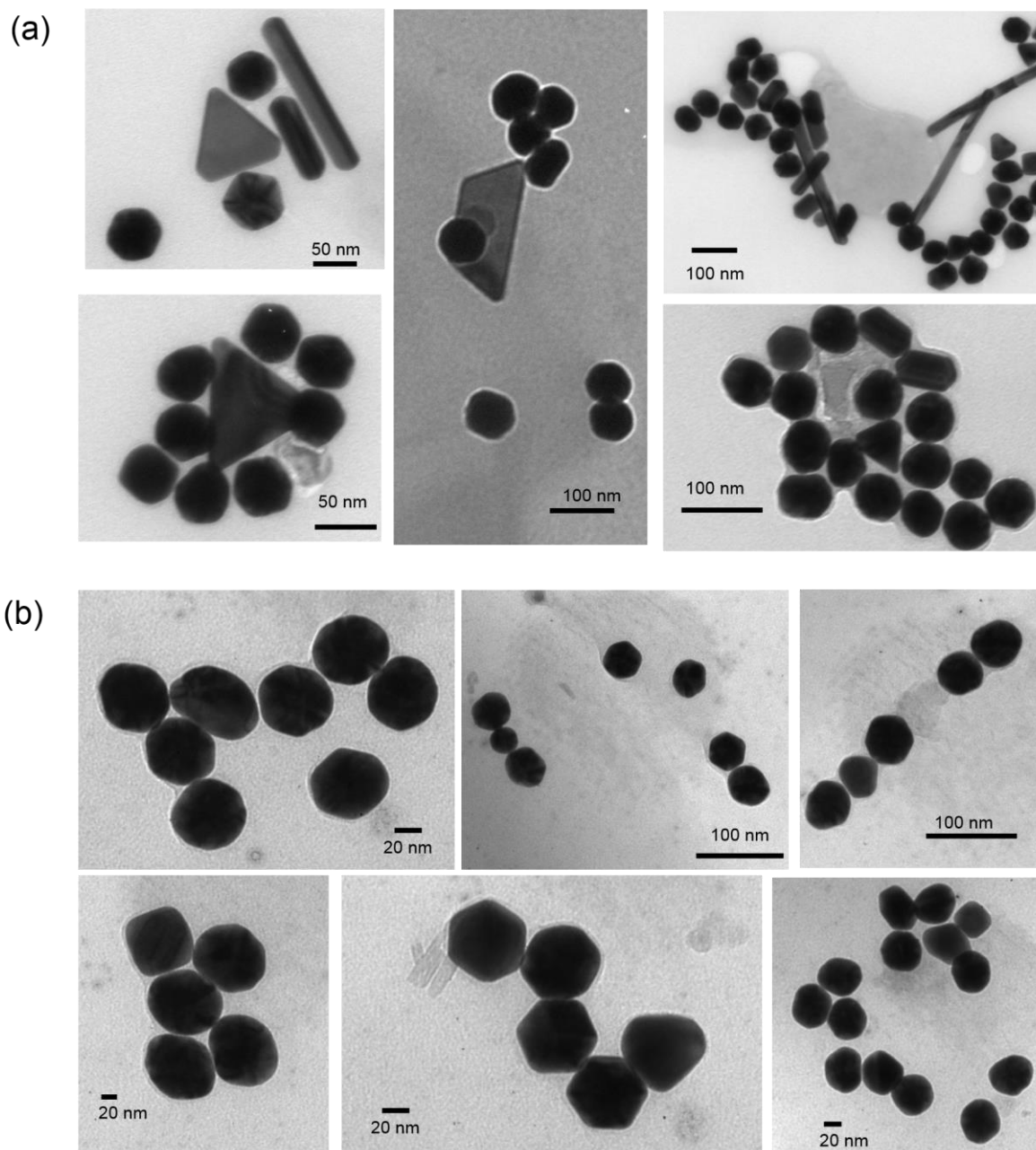
<sup>†</sup>*Department of Chemistry and Green-Nano Materials Research Center, Kyungpook National University, 80 Daehakro, Buk-gu, Daegu-city, 41566, Republic of Korea*

<sup>‡</sup>*Centre for Molecular Nanometrology, WestCHEM, Department of Pure and Applied Chemistry, Technology and Innovation Centre, University of Strathclyde, 99 George Street, Glasgow, G1 1RD, UK*

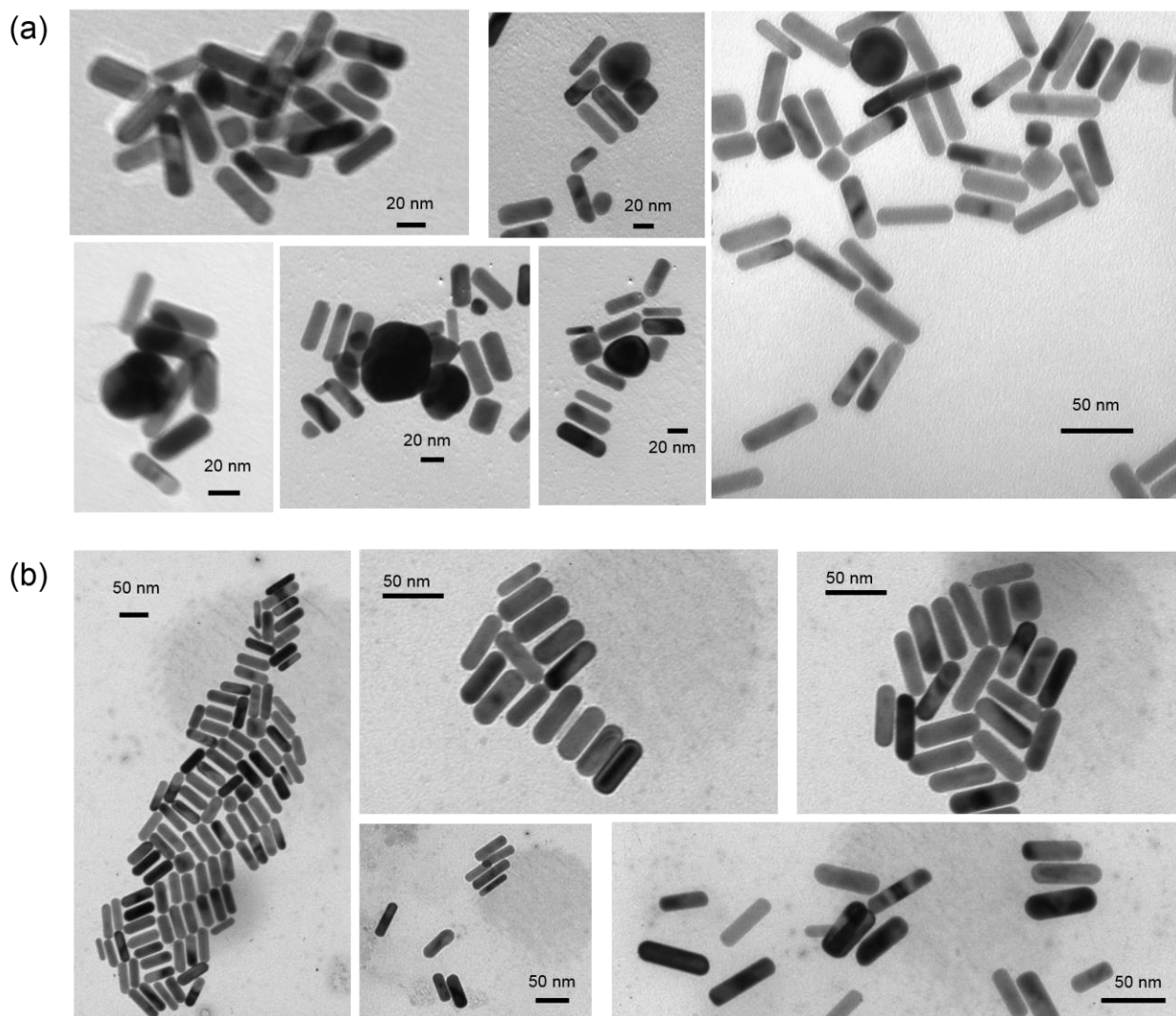
**\*Corresponding author:** *E-mail address: hyejinlee@knu.ac.kr; Tel. + 82 053 950 5336; Fax +82 053 950 6330; Postal address: Department of Chemistry and Green-Nano Materials Research Center, Kyungpook National University, 80 Daehakro, Buk-gu, Daegu-city, 41566, Republic of Korea*

## I. Supporting Figures

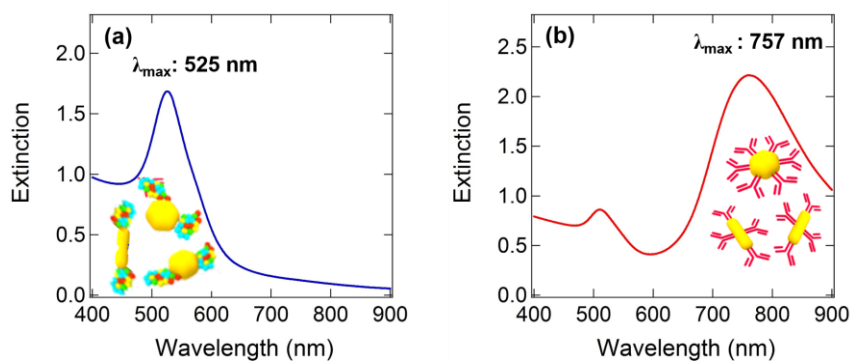
Figure S1-9 featuring TEM, UV-vis and gel images data are exhibited.



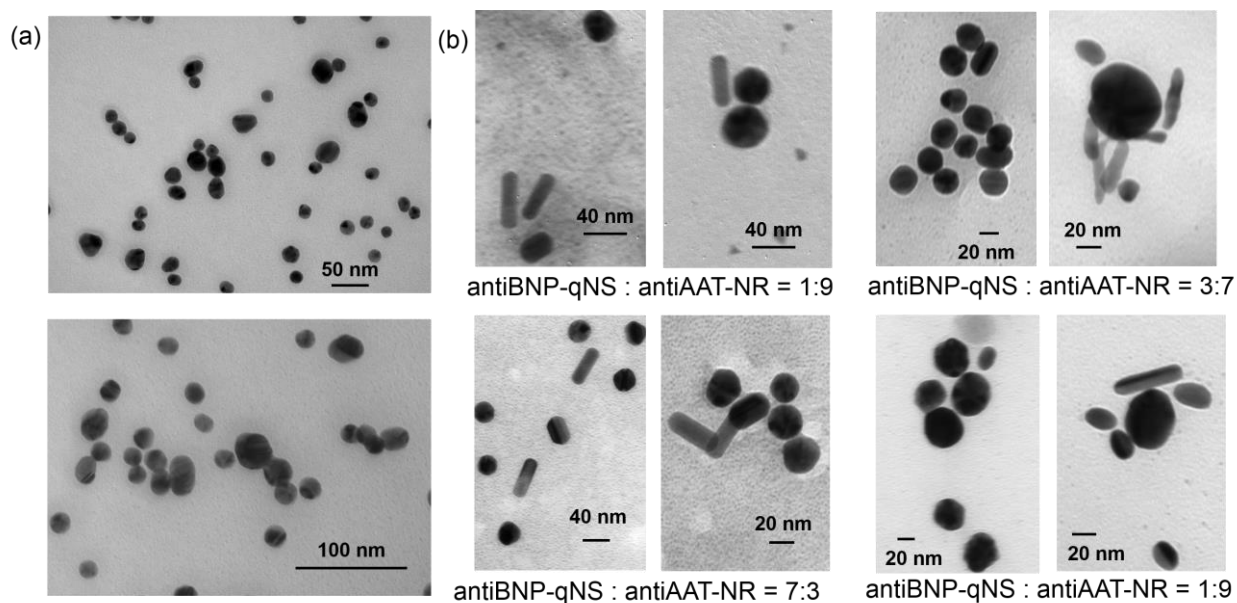
**Figure S1.** Representative TEM images of quasi-spherical nanoparticles used in figure 2 in the main text. (a) is from the colloidal stock solution and (b) is after gel separation.



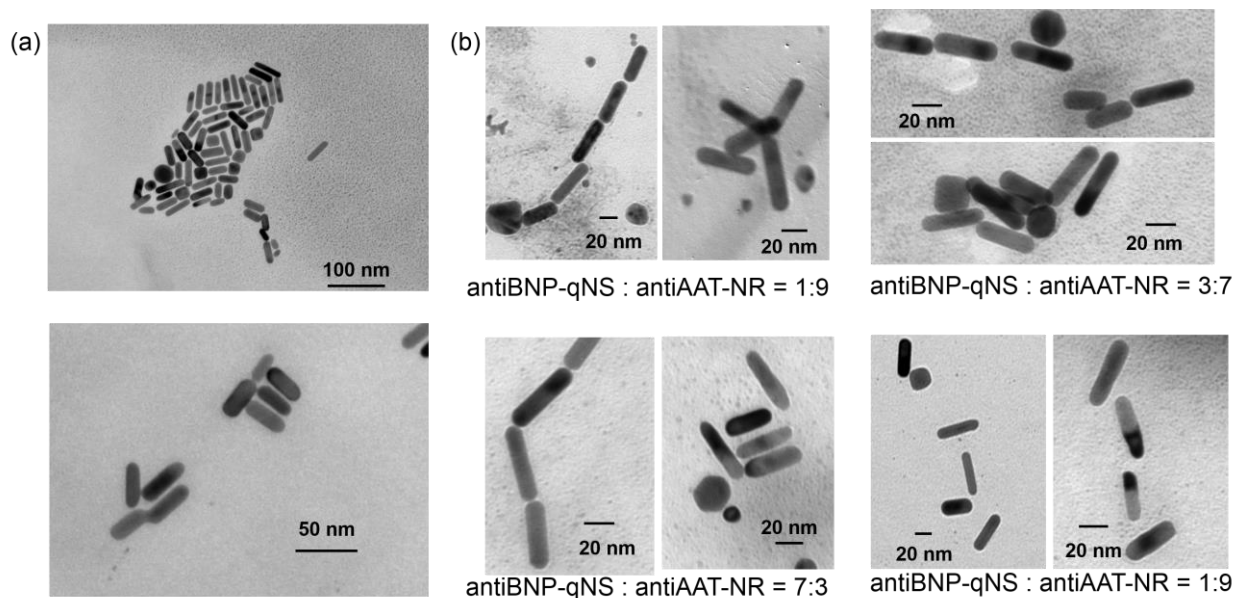
**Figure S2.** Representative TEM images of nanorods used in figure 2 in the main text. (a) is from colloidal stock solution and (b) is after gel separation.



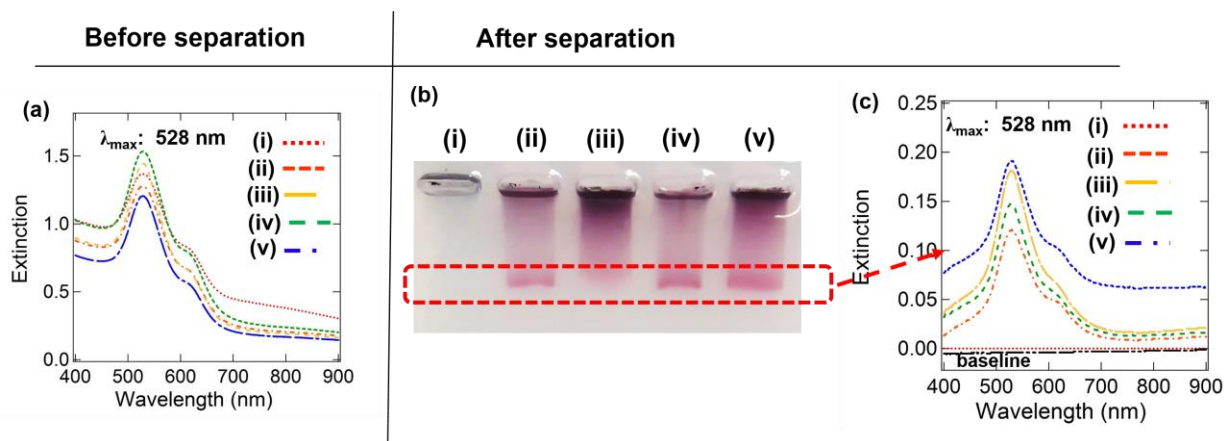
**Figure S3.** Colloidal spectra of (a) quasi-spherical nanoparticles and (b) nanorods utilized in producing the data highlighted in figures 3 and 4 of the main text.



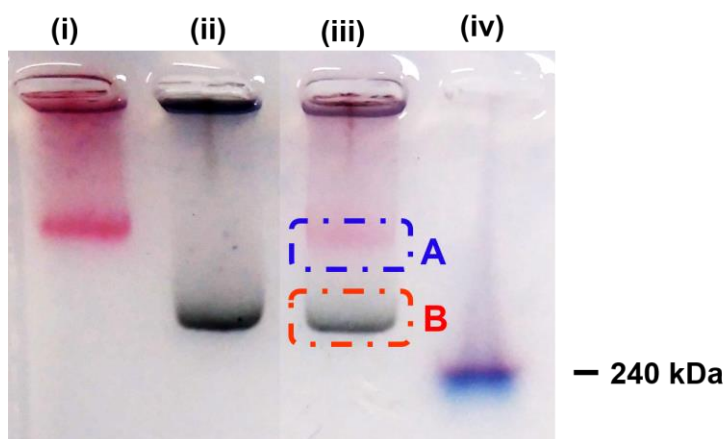
**Figure S4.** Representative TEM images of quasi-spherical nanoparticles used in figures 3 and 4 in the main text. (a) is from the colloidal stock solution and (b) is after gel separation.



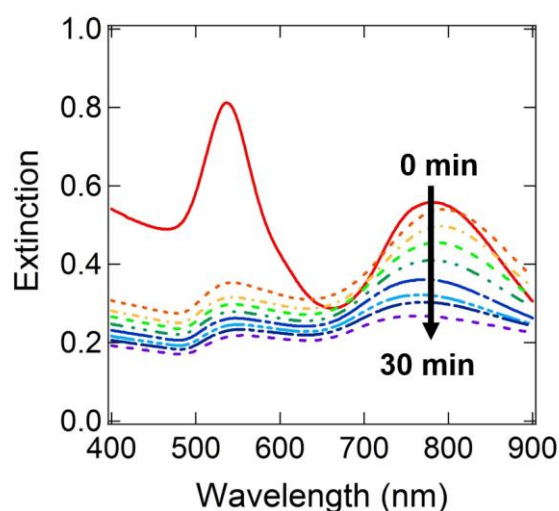
**Figure S5.** Representative TEM images of nanorods used in figures 3 and 4 in the main text. (a) is from the colloidal stock solution and (b) is after gel separation.



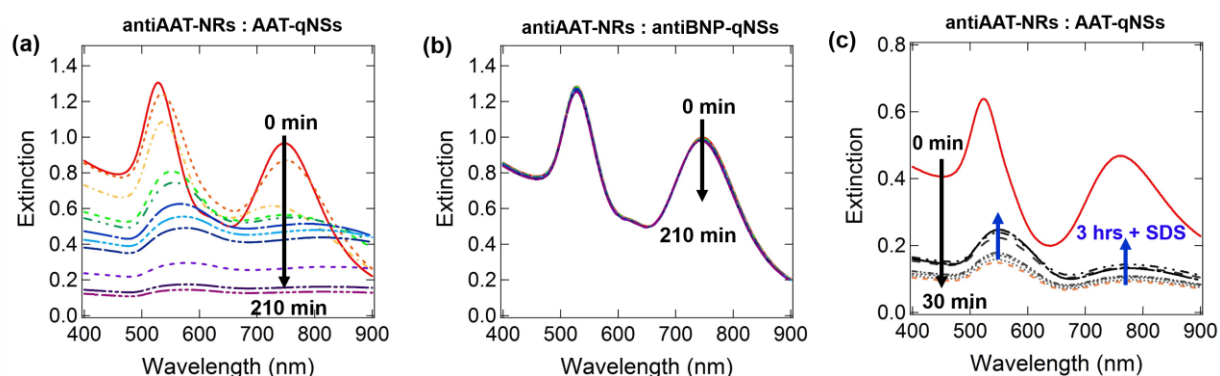
**Figure S6.** (a) UV-spectra of qNS's stock solution at different steps of the surface biofunctionalization process. (b) Images of gel lanes following separation, (i) qNS's stock, (ii) qNS's modified with MUA, (iii) qNS's modified with MUA and EDC/NHSS, (iv) qNS's modified with AAT protein and (v) qNS's modified with antiAAT. (c) Extinction spectra of highlighted regions in each lane.



**Figure S7.** Image of gel obtained following a repeat of the measurement described in figure 3 in the main article alongside the introduction of a protein molecular ladder for comparison. Lane (i) features antiBNP-qNS's only, while (ii) is antiAAT-NR's only and (iii) is a 1:1 mixture of both with the molecular ladder in (iv). The ladder contains sizes ranging from 7 to 240 kDa though no separation can be observed. In each case, the total nanoparticle concentration introduced to the gel lane was  $\sim 2$  nM. Also, the NP-conjugate batches used here are different from that used in figure 3 though the LSPR maxima are similar. The protein ladder shown in lane (iv) in fig. S7 also highlights that the gel conditions are unsuitable for molecular protein separation.



**Figure S8.** Time-dependent changes in the extinction spectrum of a 1:1 mixture of interacting antiAAT-NR and AAT-qNS conjugates ranging from initial mixing to 30 mins later. Measurements performed in presence of 1xTBE buffer only.



**Figure S9.** Monitoring of time-dependent changes in the extinction spectra in the presence of 0.1% SDS. (a) features a 1:1 mixture of interacting antiAAT-NR and AAT-qNS conjugates resuspended in 1xTBE and 0.1% SDS immediately before prior to mixing and monitoring spectral changes over 210 min. (b) Control measurement of non-interacting antiBNP-qNS's and antiAAT-NR's under same conditions as (a) highlighting colloidal stability. (c) Interacting antiAAT-NR and AAT-qNS conjugates are first mixed in buffer only for 30 mins before adding SDS (final concentration = 0.1%), which causes a smaller part reversal of the NP assembly. Comparison of (a) and (c) shows that the presence of SDS does not impede the bioaffinity interaction but can impact the assembly kinetics.