Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supporting Information to "Shape anisotropy induced jamming of nanoparticles at liquid interface: A tensiometric study"

Chandan Kumar,[†,‡] Suman Bhattacharjee,[¶,‡] and Sunita Srivastava[*,‡]

[1] †*Department of Materials Science and Engineering, Nagoya University, Nagoya, 464-8603, Aichi, Japan*

‡*Soft Matter and Nanomaterials Laboratory, Department of Physics, Indian Institute of Technology Bombay, Mumbai-400 076, India*

¶*Centre for Research in Nanotechnology & Science (CRNTS), Indian Institute of Technology Bombay, Mumbai-400 076, India*

E-mail: sunita.srivastava@phy.iitb.ac.in

Phone: +91-22-2576-7572

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1 Transmission Electron Microscopy (TEM) of AuNR and AuNP

Synthesized particles are imaged using transmission electron microscopy (JEOL, JEM-2100F, FEGTEM 200 kV) as shown in Figure S1(a,c) below. Using ImageJ[1] software aspect ratio and size distribution for AuNR and AuNP, respectively, are obtained. Gaussian fit of the histograms shows the average aspect ratio of AuNR is ~ 4 [Figure S1(b)] and the size of AuNP is $\sim 16\ nm$ [Figure S1(d)].

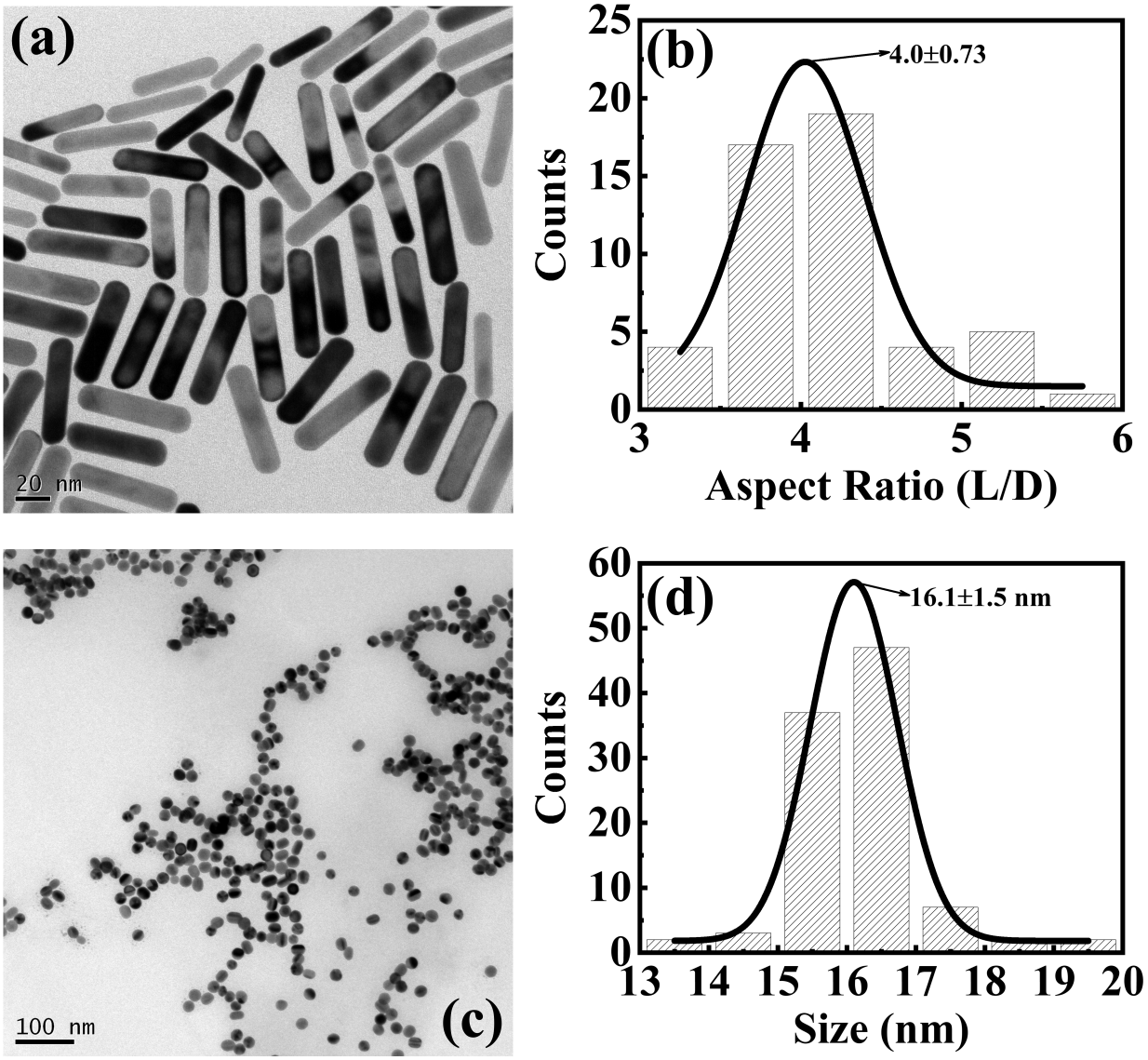

Figure S1: TEM micrographs for synthesized AuNR (a) and AuNP (c) are shown. Scale bars are $20nm$ and $100nm$ in (a) and (c), respectively. Size distribution histogram fitted with a Gaussian profile giving estimates of AuNR aspect ratio (L/D) in Figure S1(b) and AuNP size in Figure S1(d).

2 UV-Visible spectroscopy

UV-visible spectra for AuNR and AuNP colloidal solution are obtained using JASCO V-730 Spectrophotometer. For AuNR [Figure S2(a)], we observe two peaks for longitudinal (LSPR at 819 nm) and transverse (TSPR at 508 nm) plasmon resonance due to the anisotropic

geometry. For AuNP, the absorbance peak is at 525 nm [Figure S2(b)]. Using the maximum absorbance values at LSPR for AuNR and AuNP, concentration is estimated using Beer Lambert's law.[2]

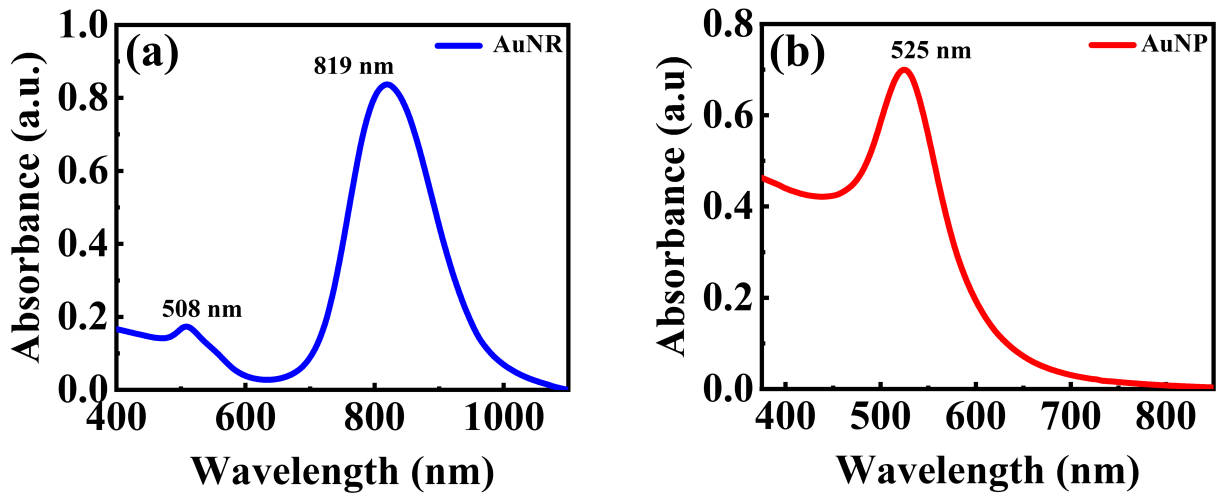

Figure S2: UV-Vis spectra for AuNR (a) and AuNP (b) showing SPR peaks.

3 Dynamic Light Scattering (DLS) and Zeta Potential measurement

DLS measurements on the colloidal particles are done using Zetasizer NanoZS (Malvern). Since AuNRs have translational and rotational diffusion constants, an approximate hydrodynamic size is obtained [Figure S3(a)] which is closer to the size calculated from TEM images. Zeta potential in Figure S3(b) shows a positive charge on the rods due to CTAB layer.

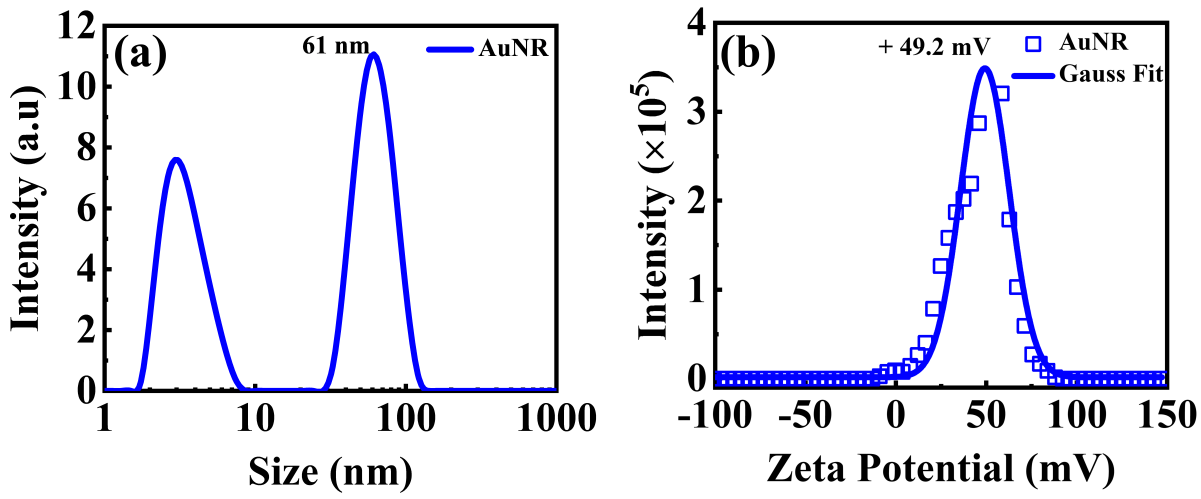

Figure S3: Hydrodynamic size (a) & Zeta potential (b) estimation for AuNR

Hydrodynamic size of spherical AuNP is estimated correctly [Figure S4(a)]. Zeta potential in Figure S4(b) shows a positive charge on the particles due to CTAB layer. Both zeta potential values indicate stable colloidal solutions.

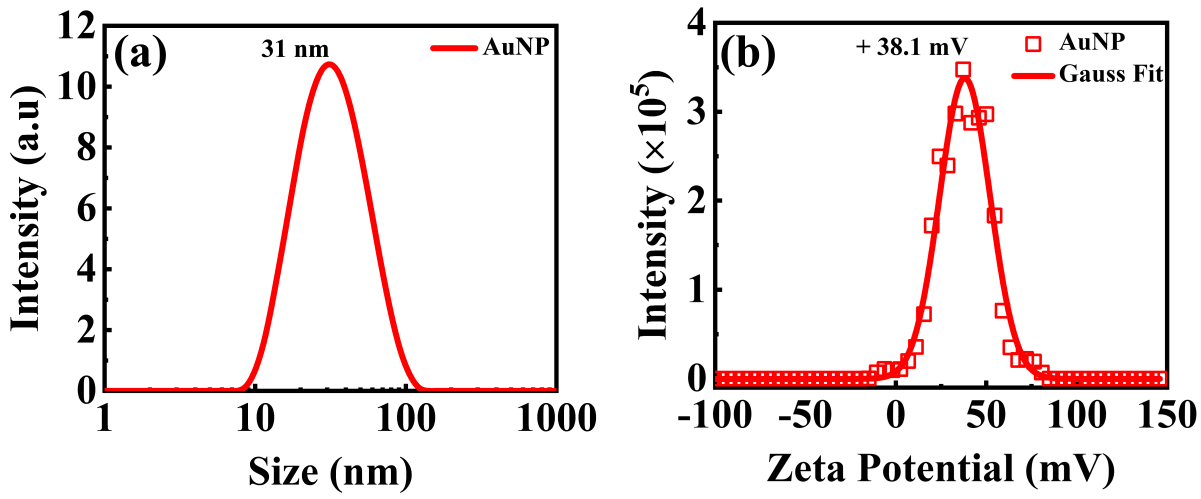

Figure S4: Hydrodynamic size (a) & Zeta potential (b) estimation for AuNP

4 Adsorption kinetics : Linear fitting to determine K_{ads} and K_{arr}

Figure S5 shows an indicative plot for the calculation of the rate constants. From the $\gamma - t$ plot of both the systems, the data is fitted using the Graham-Phillips equation to find out the rate constants such as K_{ads} and K_{arr}. The first slope signifies K_{ads} and the latter gives K_{arr}.

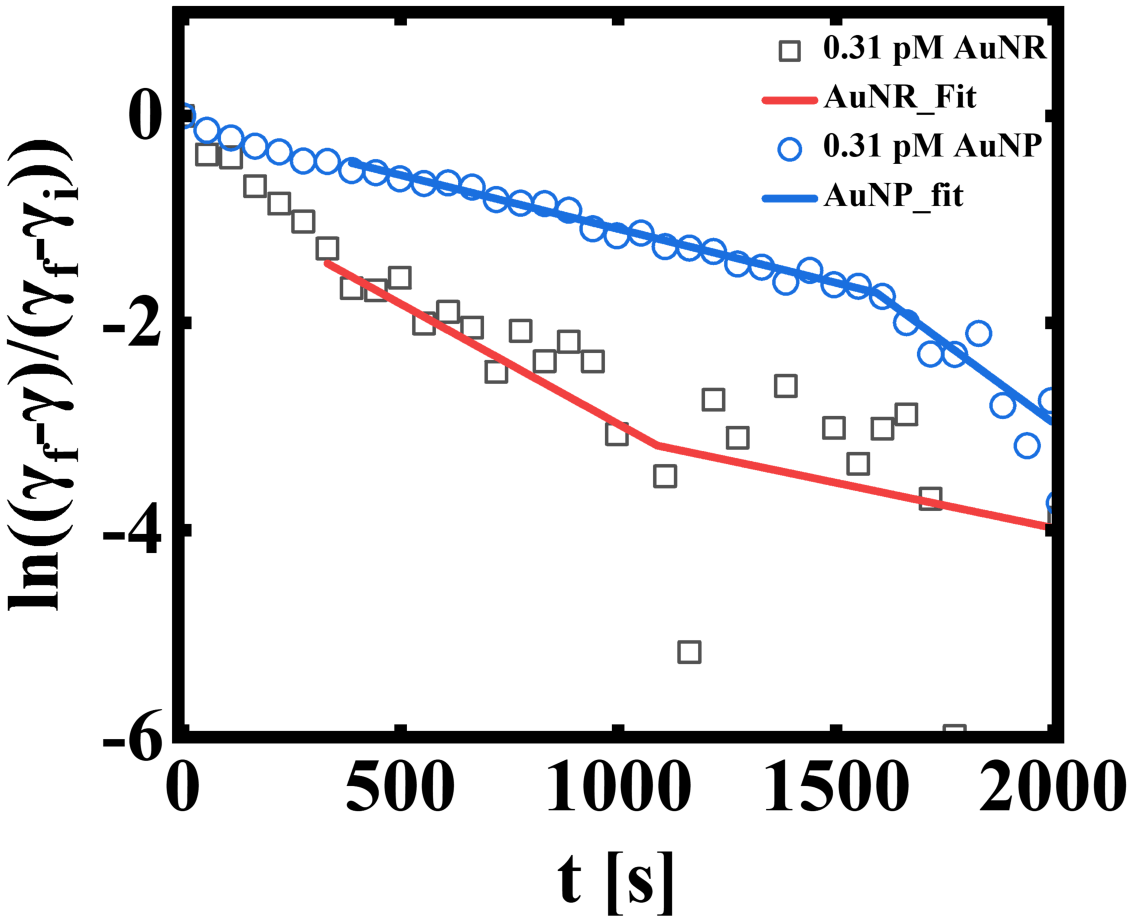

Figure S5: Linear fitting using the Graham-Phillips equation for AuNP and AuNR systems.

References

(1) Schneider, C. A.; Rasband, W. S.; Eliceiri, K. W. NIH Image to ImageJ: 25 years of image analysis. *Nature Methods* **2012**, *9*, 671–675.

(2) McNaught, A. D.; Wilkinson, A., et al. *Compendium of Chemical Terminology*; Blackwell Science Oxford, 1997; Vol. 1669.