

## Supporting Information

# Surface-Chemistry Effect on Cellular Response of Luminescent Plasmonic Silver Nanoparticles

*Shasha Sun,<sup>†</sup> Chen Zhou,<sup>†,‡</sup> Sishan Chen,<sup>†</sup> Jinbin Liu,<sup>†</sup> Liang Zhao,<sup>†</sup> Jing Yu,<sup>†</sup> Jennifer Chilek,<sup>†</sup>  
Mengxiao Yu,<sup>†</sup> Rodrigo Vinluan,<sup>†</sup> Bo Huang,<sup>§</sup> and Jie Zheng<sup>†,\*</sup>*

<sup>†</sup>*Department of Chemistry, The University of Texas at Dallas, Richardson, Texas 75080, United States.* <sup>‡</sup>*School of Environmental, Physical, and Applied Sciences, University of Central Missouri, Warrensburg, Missouri 64093, United States.* <sup>§</sup>*Department of Pharmaceutical Chemistry, University of California, San Francisco, CA 94158, United States.*

Corresponding email: [jiezheng@utdallas.edu](mailto:jiezheng@utdallas.edu)

## Materials and Equipment

### Supplementary Figures

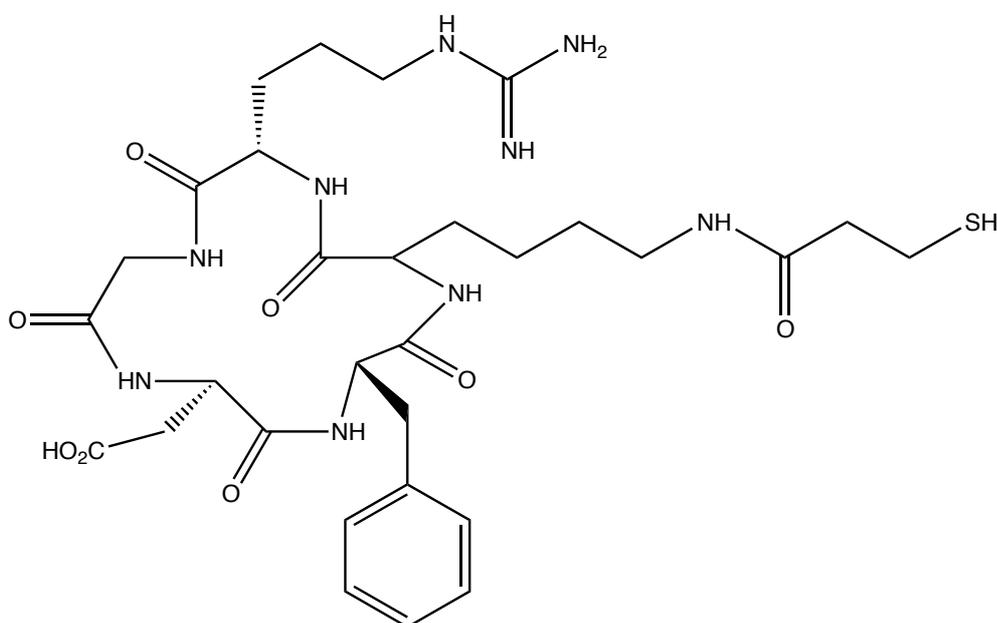
- Figure S1:** The chemical structure of the thiolated c-RGD peptide c(RGDfK)-SH.
- Figure S2:** Bright field image of the c-RGD-LPAGNPs labeled U87MG cancer cells.
- Figure S3:** Fluorescence image of live U87MG cancer cells incubated with PEG-LPAGNPs and c-RGD-LPAGNPs for 3h.
- Figure S4:** Raman spectra of PEG-LPAGNPs in PBS with 10% FBS and Raman spectra of c-RGD-LPAGNPs in PBS with 10% FBS.
- Figure S5:** LPAGNPs were incubated in PBS with 10% FBS for 0.5 h, then re-separated from FBS through centrifugation purification and re-dissolved in PBS.
- Figure S6:** Raman spectra of c-RAD-LPAGNPs in PBS, endosome, MEM and PBS with 10% FBS.

### Materials and Equipment

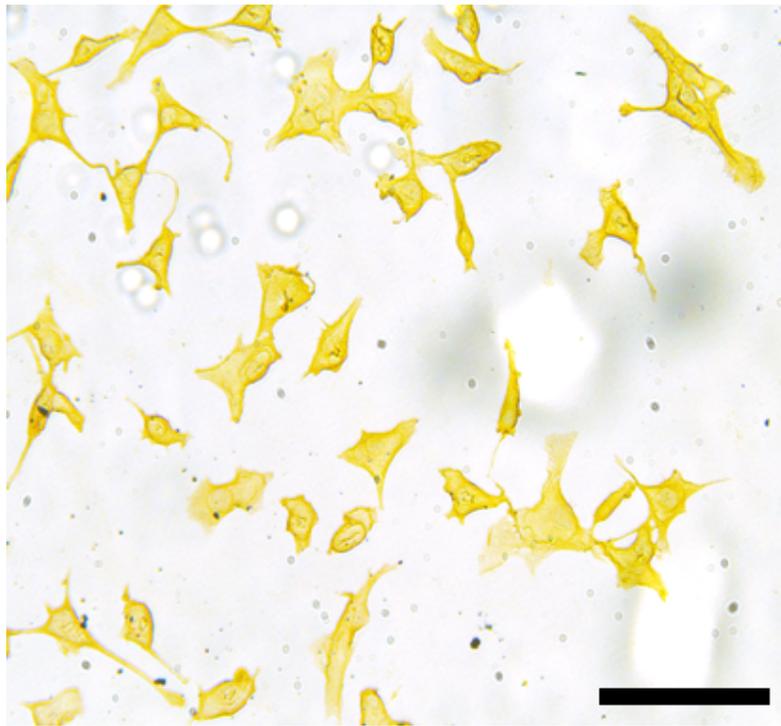
All chemicals were purchased from Fisher Scientific or Sigma-Aldrich unless otherwise specified, and were used as received without further purification. Thiolated c-RGD peptide was synthesized by and purchased from GL Biochem (Shanghai) Ltd. (Cat. No. RK-5105524). Peptide c-RADfC was purchased from Peptides International. Transmission electron microscopy (TEM) images of the luminescent plasmonic silver nanoparticles (LPAGNPs) were obtained using a JEOL 2100 transmission electron microscope with a 200 kV accelerating voltage. Hydrodynamic diameters (HDs) of the samples in the aqueous solution were analyzed using a Brookhaven 90Plus Dynamic Light Scattering (DLS) Particle Size Analyzer. All the nanoparticles were filtered by 0.1  $\mu\text{m}$  filters (Whatman, Cat. No. 6809-1002) before the DLS analysis. Zeta potentials of the nanoparticles were obtained using a Brookhaven ZetaPALS instrument. Absorption spectra were taken using a Varian 50 Bio UV-Vis spectrophotometer. Ensemble SERS spectra and emission spectra of the LPAGNPs were collected under 532 nm laser excitation using an Acton SP2300 (Princeton Instruments) with a 1200  $\text{l}/\text{mm}$  grating and a Pixis 256 CCD camera (Princeton Instruments). Fluorescence cell images

were obtained under Hg-lamp excitation (Ex: 532-587 nm; Em: 605-682 nm; 30 W/cm<sup>2</sup>; 0.5 s exposure time). Both fluorescence and bright field cell images were collected by an IX-71 inverted microscope (Olympus) with a 1.3NA 100× oil-immersion objective and a Photon Max 512 CCD camera (Princeton Instruments).

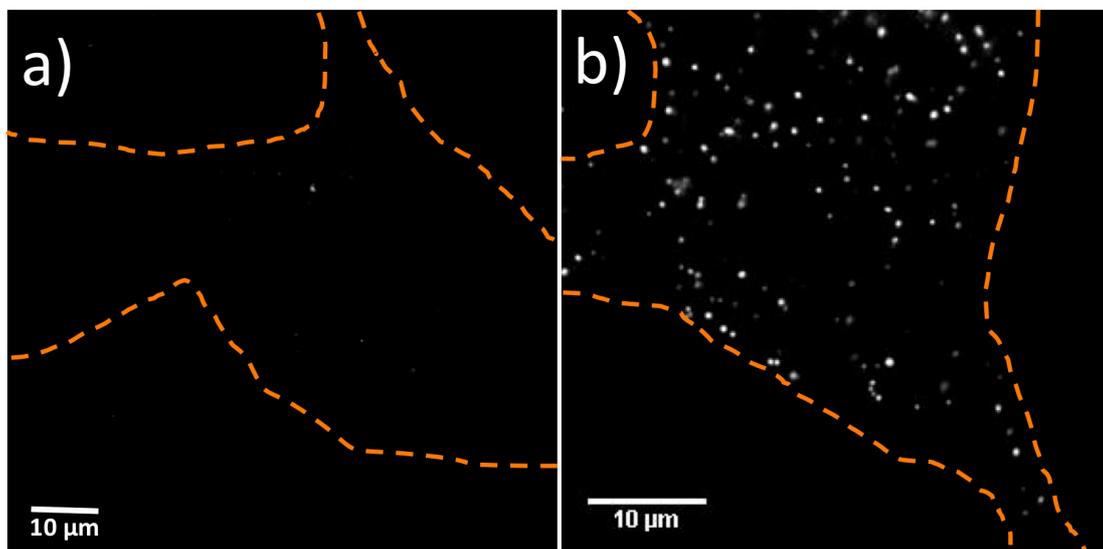
### Supplementary Figures



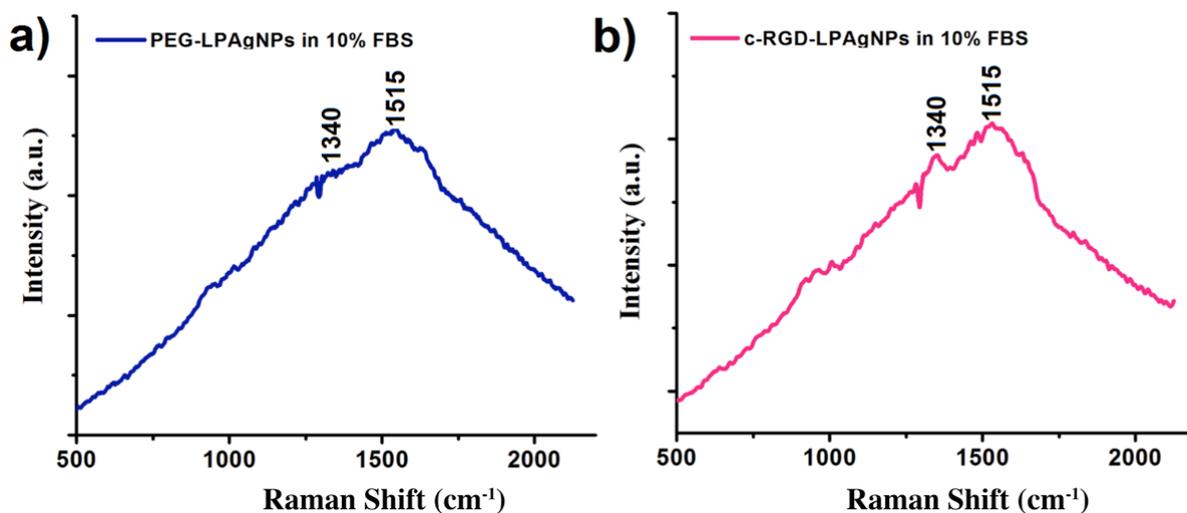
**Figure S1.** The chemical structure of the thiolated c-RGD peptide c(RGDfK)-SH.



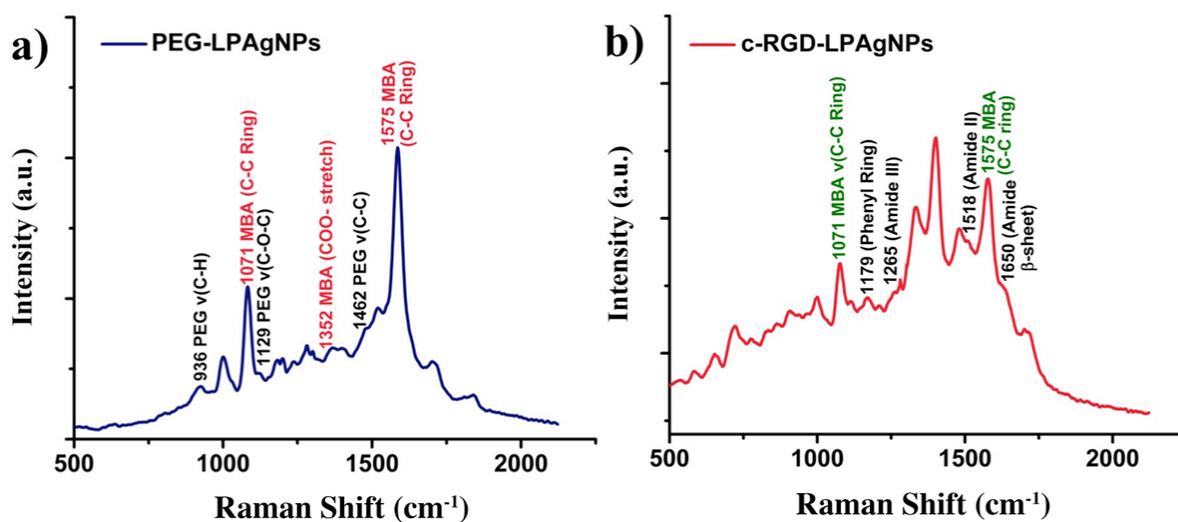
**Figure S2.** Bright field image of the c-RGD-LPAGNPs labeled U87MG cancer cells (scale bar: 50  $\mu\text{m}$ ).



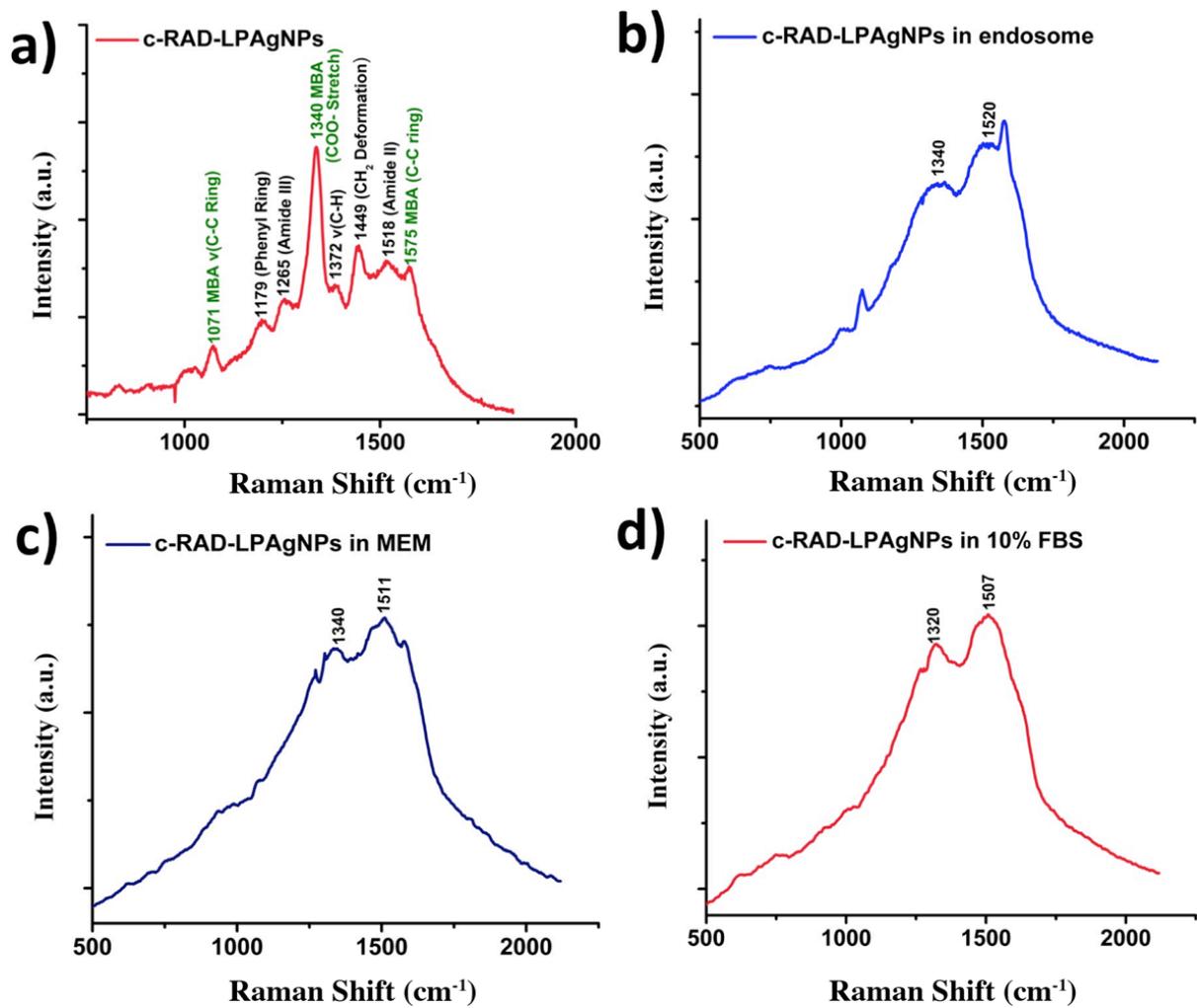
**Figure S3.** (a) Fluorescence image of live U87MG cancer cells incubated with 1 nM PEG-LPAGNPs for 3 h. (b) Fluorescence image of live U87MG cancer cells incubated with 1 nM c-RGD-LPAGNPs for 3 h.



**Figure S4.** (a) Raman spectra of PEG-LPAgNPs in PBS with 10% FBS (v/v). (b) Raman spectra of c-RGD-LPAgNPs in PBS with 10% FBS.



**Figure S5.** LPAgNPs were incubated in PBS with 10% FBS for 0.5 h, then re-separated from FBS through centrifugation purification and re-dissolved in PBS. (a) Raman spectra of PEG-LPAgNPs in PBS. (b) Raman spectra of c-RGD-LPAgNPs in PBS.



**Figure S6.** (a) Raman spectra of c-RAD-LPAgNPs in PBS. (b) Raman spectra of c-RAD-LPAgNPs in endosome. (c) Raman spectra of c-RAD-LPAgNPs in MEM. (d) Raman spectra of c-RAD-LPAgNPs in PBS with 10% FBS.