

Effect of Ions and Ionic Strength on Surface Plasmon Absorption of Single Gold Nanowires

Susil Baral¹, Andrew J. Green¹, and Hugh H. Richardson^{1*}

¹Department of Chemistry and Biochemistry, Ohio University, Athens, Ohio 45701

Supporting Information for Publication

SEM Image of the Nanowire

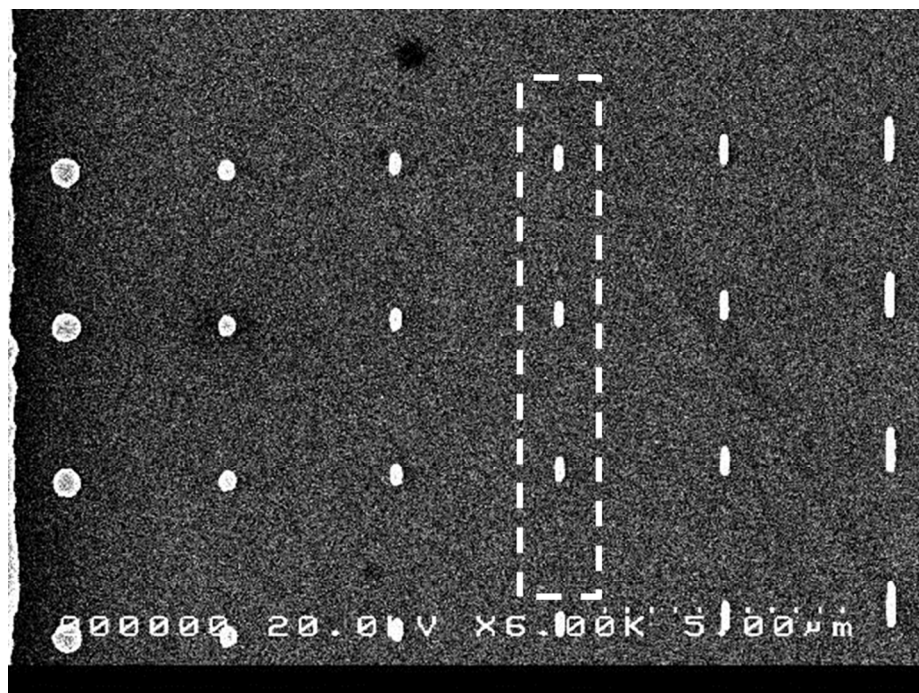


Figure S1. SEM image of the gold nanowires. The nanowires highlighted inside the white dashed lines represent the typical nanowire studied on this work and has typical dimensions of width and length of 200 ± 8 nm and 500 ± 15 nm respectively.

Representative Absorption Spectra of a Single Gold Nanorod(s)

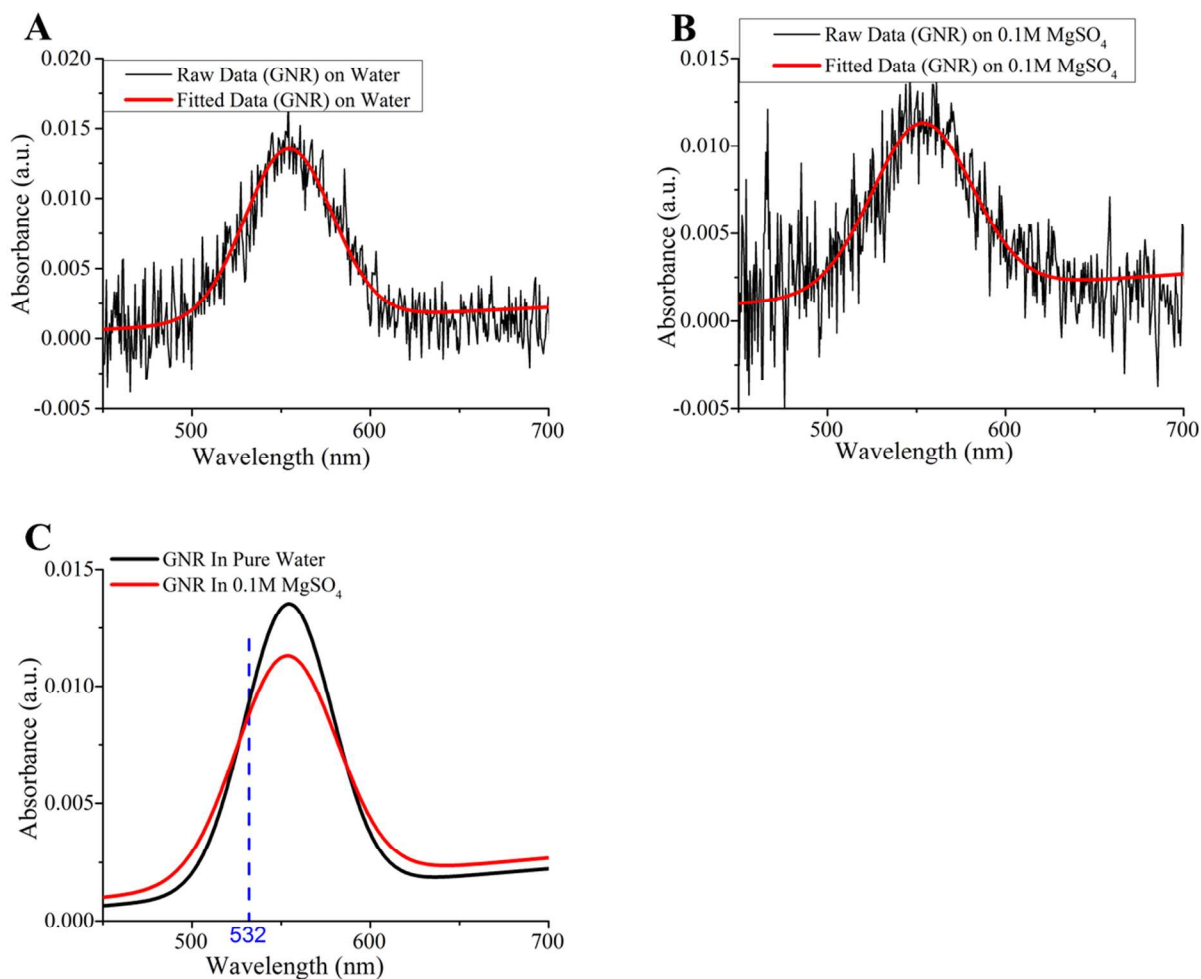


Figure S2. Absorption spectra of a single gold nanorod(s) spin coated onto the glass cover slip substrate under pure water and 0.1M MgSO_4 solution. The fitted spectra (Figure 4C) do not show noticeable shift on the plasmon resonance wavelength but shows clear attenuation on plasmon absorbance of the gold nanorod(s) immersed under ionic solution of 0.1M MgSO_4 .

Representative Absorption Spectra and Thermal Profile of a Single Gold Nanoparticle(s)

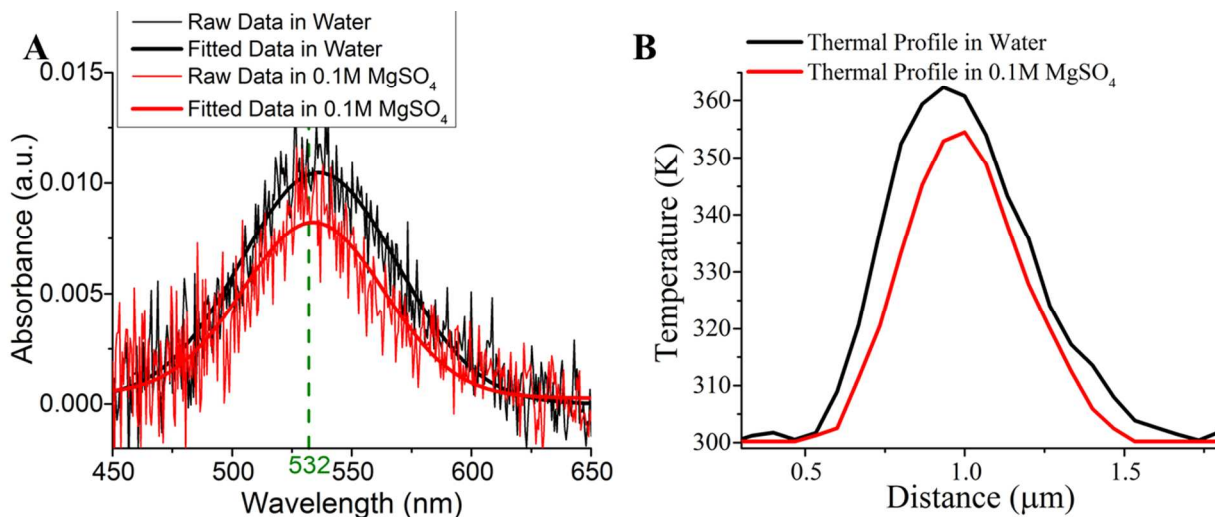


Figure S3. (A) Absorption spectra and (B) the thermal profile under 532nm CW (Intensity 6×10^9 W/m²) excitation of 40nm gold nanoparticle(s) spin-coated onto the substrate with thermal sensor film of AlGaIn:Er³⁺ on sapphire glass. Black spectra represent the absorption spectrum and the corresponding thermal profile for the nanoparticle(s) excitation in pure water. Red spectra represent the absorption spectrum and the corresponding thermal profile for the same nanoparticle(s) in 0.1M MgSO₄ solution. The spectra do not show any noticeable shift on plasmon absorption band but shows attenuation on plasmon absorbance of the nanoparticle(s). At 532 nm, absorption spectrum shows about 16% attenuation on plasmon absorbance (from 0.00985 to 0.00821) and the corresponding drop in maximum temperature change (ΔT_{\max}) is about 14% (drop from 363 to 354).

Single Particle(s) Absorption, Dark Field Scattering and Plasmon Emission Images

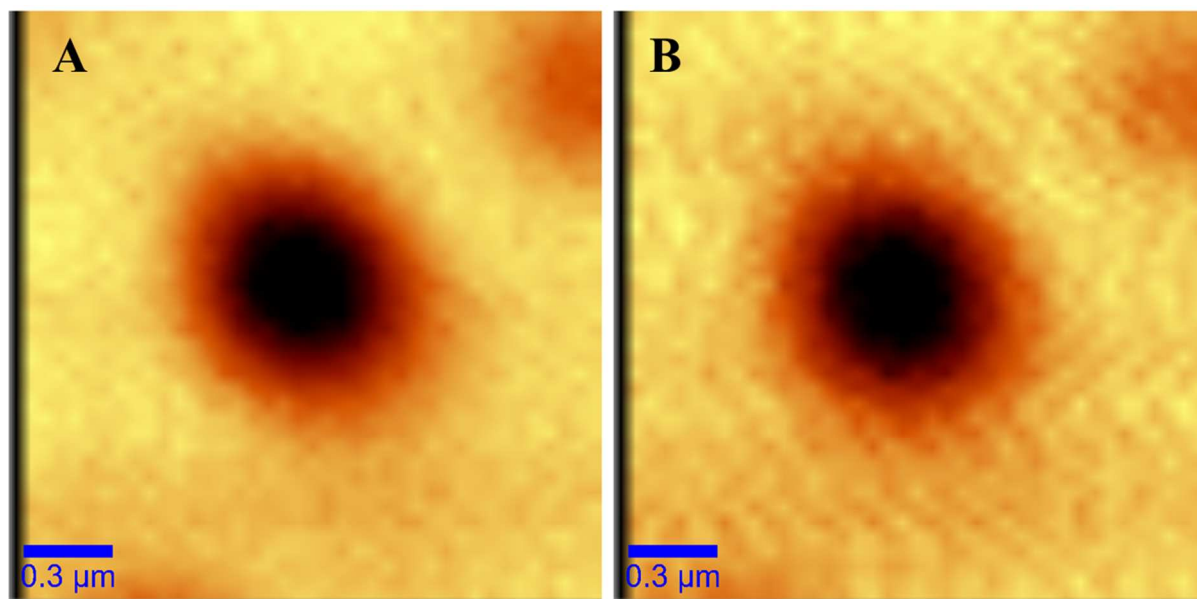


Figure S4. Absorption Images of a single gold nanoparticle(s) spin coated onto the glass cover slip substrate under (A) pure water and (B) 0.1M MgSO_4 solution.

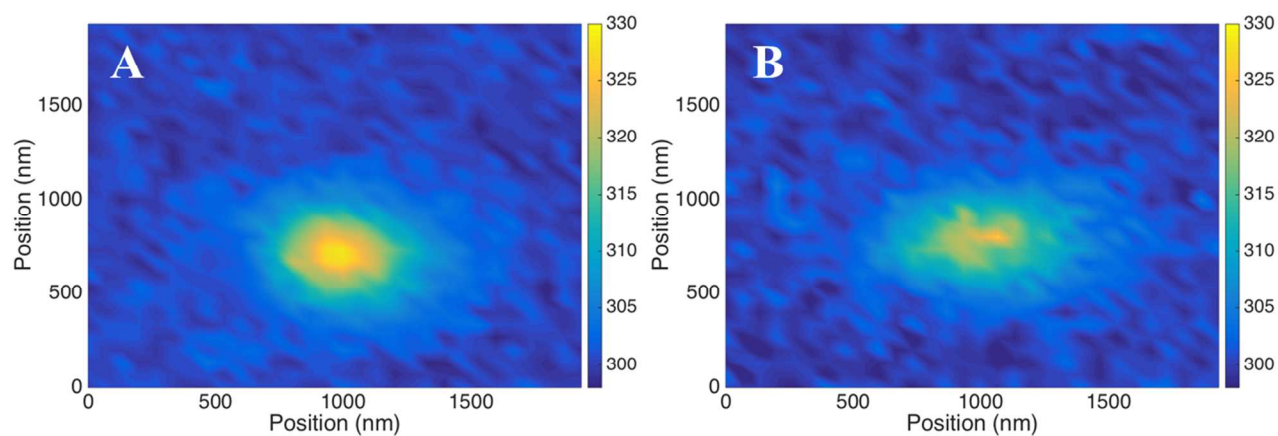


Figure S5. Thermal images of a single optically excited gold nanoparticle(s) spin coated onto the substrate with thermal sensor film of AlGaIn:Er^{3+} on sapphire glass in (A) pure water and (B) 0.1 M MgSO_4 solution.

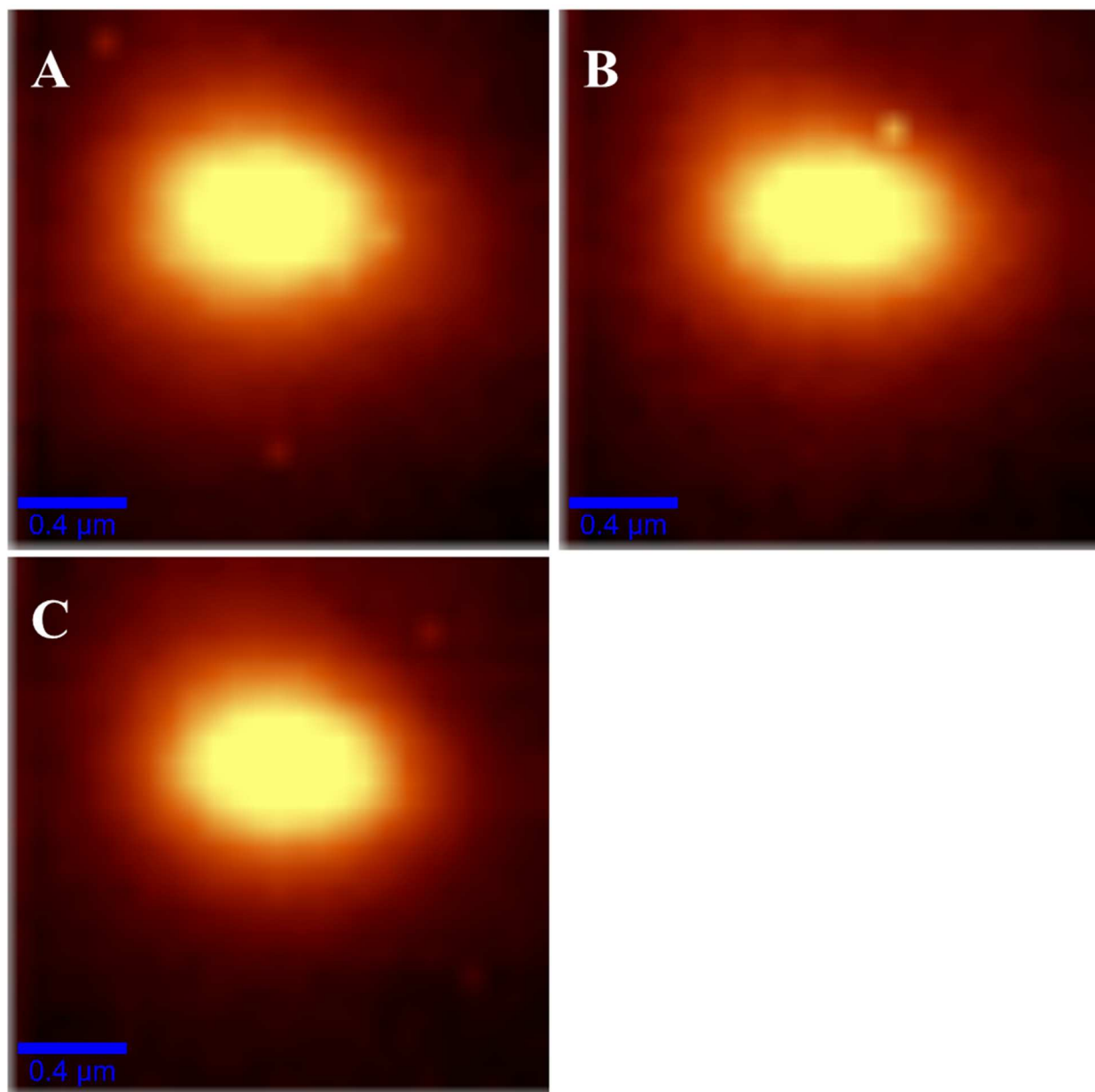


Figure S6. Dark-Field scattering images of a single lithographic gold nanowire under (A) pure water, (B) 0.1M NaCl and (C) 0.1M MgSO₄ solution.

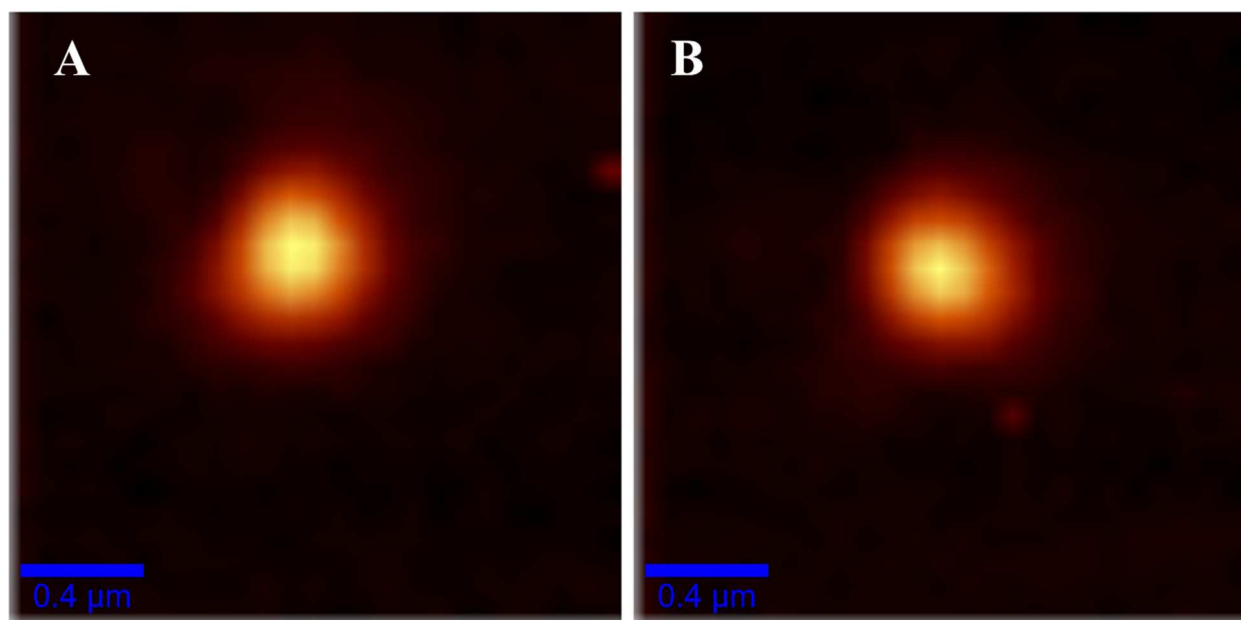


Figure S7. Plasmon emission images of a single gold nanoparticle(s) spin coated onto the glass cover slip substrate under 533nm CW excitation in (A) pure water and (B) 0.1M MgSO_4 solution.