

## Supporting Information for Publication

# Colloidally Stable and Surfactant-Free Protein-Coated Gold Nanorods in Biological Media

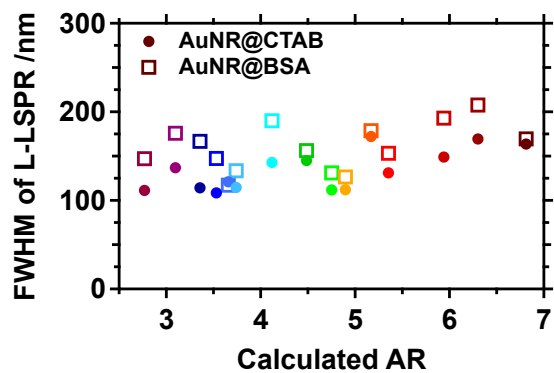
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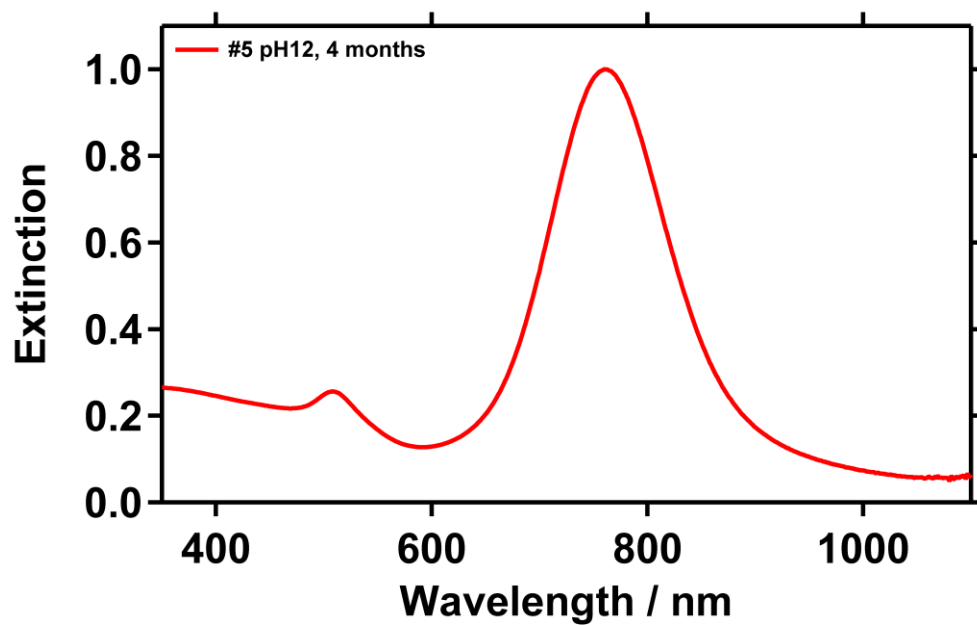
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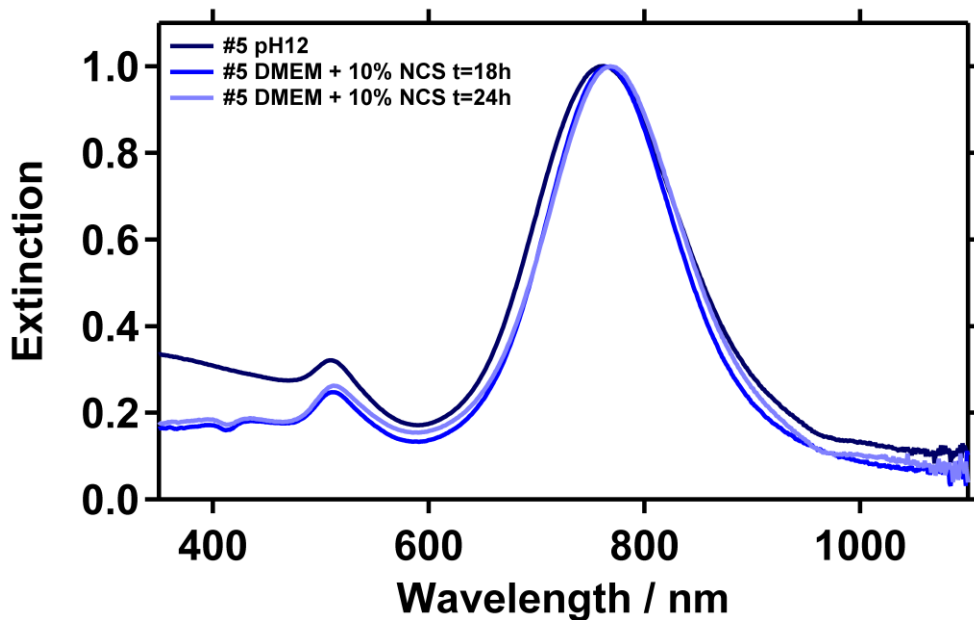
**Figure S1:** AuNRs before and after functionalization with BSA (compare Figure 1).



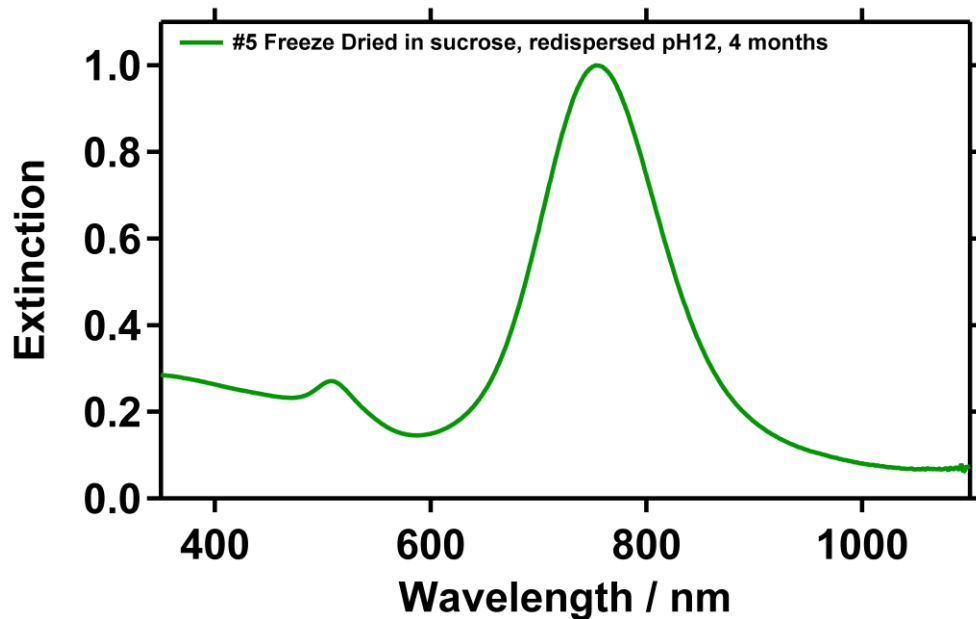
**Figure S2:** Redispersion behavior of lyophilized powder of BSA-coated AuNR No. 15 without additional lyoprotecting agents. The powder did not redisperse spontaneously in Milli-Q water at pH 12.



**Figure S3:** UV/vis/NIR extinction of a dispersion of BSA-coated AuNR No. 5 (non-freeze-dried) in Milli-Q water at pH 12 after 4 months of storage at 4°C. The longitudinal LSPR peak is located at 760 nm



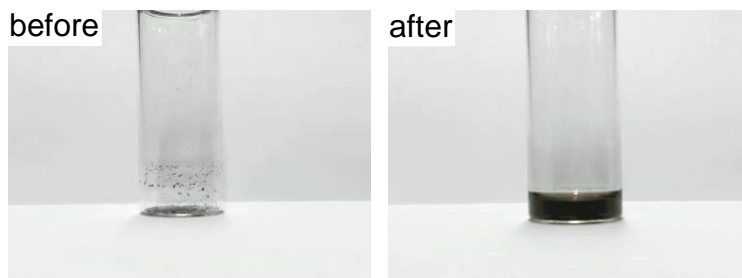
**Figure S4:** UV/vis/NIR extinction of freeze-dried powder of AuNR@BSA No. 5 (with sucrose as lyoprotecting agent), freshly redispersed in Milli-Q water at pH 12 (dark blue, L-LSPR 760 nm) and in DMEM + 10% NCS after 18 h (L-LSPR 765 nm) and 24 h (L-LSPR, 768 nm) at room temperature. The L-LSPR shift is due to changes in local refractive index owed to the adsorption of protein. The AuNRs do not sediment and the spectra do not broaden over time, proving the excellent stability of the system.



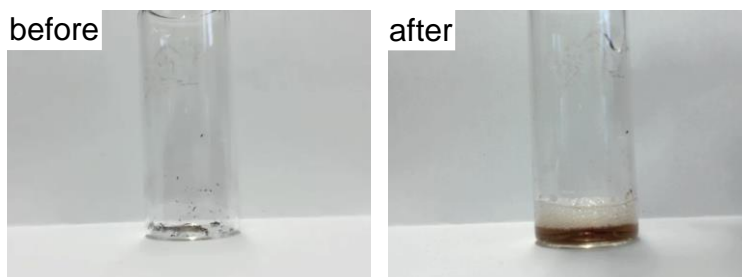
**Figure S5:** UV/vis/NIR extinction of a redispersed powder of BSA-coated AuNR No. 5 (freeze-dried with sucrose as lyoprotecting agent) in Milli-Q water at pH 12 after 4 months of storage at 4 °C. The longitudinal LSPR peak is located at 753 nm.

**Further information on redispersion behavior of lyophilized AuNR@BSA powders.**

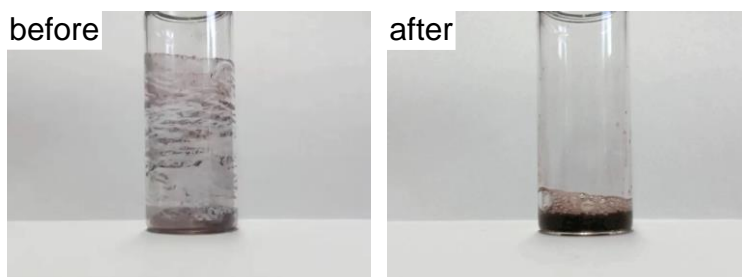
Videos V1, V2, and V3 show the spontaneous redispersion of freeze-dried AuNR@BSA powders with three different lyoprotecting agents. In the following, each video is represented by still images before and after redispersion with Milli-Q water at pH 12.



**Video V1:** Redispersion of powder of freeze-dried AuNR@BSA No. 5 with sucrose (1 mg/mL,  $c_{\text{Au}}=0.34$  mM) as lyoprotecting agents in Milli-Q water at pH 12.



**Video V2:** Redispersion of powder of freeze-dried AuNR@BSA No. 15 with BSA (1 mg/mL,  $c_{\text{Au}}=0.16$  mM) as lyoprotecting agents in Milli-Q water at pH 12.



**Video V3:** Redispersion of powder of freeze-dried AuNR@BSA No. 11 with medium and serum (DMEM + 10% NCS;  $c_{\text{Au}}=0.12$  mM) as lyoprotecting agents in Milli-Q water at pH 12.