Supporting Information

A Database on the Stability of Silver and Gold Nanostructures for Applications in Biology and Biomolecular Sciences

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S1 - Optimization of Nanoparticle Synthesis

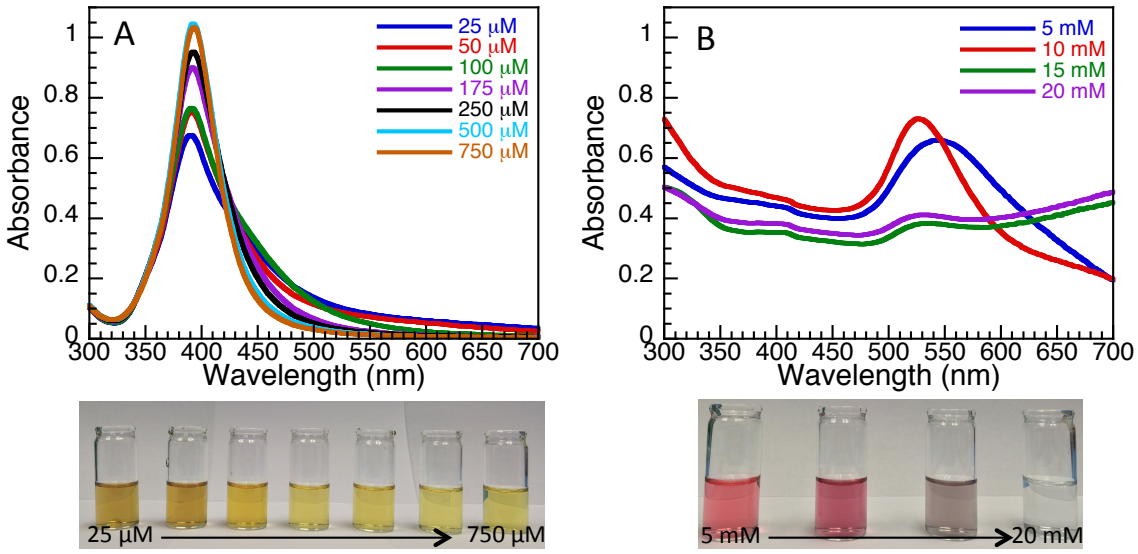

Figure S1.1: UV-Vis spectra of AgNP(A) and AuNP (B) stabilized with different concentrations of glucosamine and the visual depiction of the corresponding colloidal solutions.

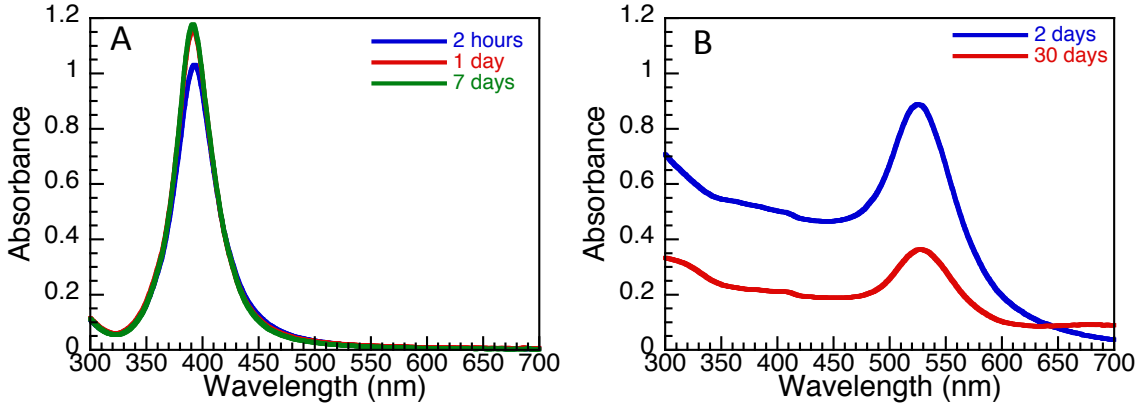

Figure S1.2: UV-Vis spectra of AgNP stabilized with 750 µM glucosamine (A) and AuNP stabilized with 10 mM glucosamine at various time points.

Optimal concentrations of the stabilizer (aspartame, glucosamine and sucralose) were chosen for each AgNP, AuNP and AuNP@Ag synthesis. The figures above illustrate 3 optimization experiments conducted for AgNP@Glu and AuNP@Glu.

S2 - Biological Media Composition

Table S1: Chemical composition of media used for stability testing

Category	Media	Ingredients
Biological Buffers (pH 7.4)	HEPES[1]	2.383 g/L 4-(hydroxyethyl)-1-piperazineethanesulfonic acid
	Phosphate Buffer Saline (PBS)[1]	0.2 g/L KCl, 0.2 g/L KH_2PO_4, 8.0 g/L NaCl, 1.15 g/L Na_2HPO_4
	Saline	9 g/L NaCl
Bacteriological Growth Media	Luria Bertani (LB) Broth[1]	10 g/L tryptone, 5 g/L yeast extract, 5 g/L NaCl
	Mueller Hinton (MH) Broth[1]	2 g/L beef infusion solids, 1.5 g/L starch, 17.5 g/L casein hydrolysate
	Minimal Salts (M9) Media	6 g/L Na_2HPO_4, 3 g/L KH_2PO_4, 0.5 g/L NaCl, 1 g/L NH_4Cl, 2 g/L glucose
Eukaryotic Growth Media	Dulbecco's Modified Eagle Medium (DMEM) without phenol red[1,2]	0.2 g/L $CaCl_2$, 0.0001 g/L $Fe(NO_3)_3 \cdot 9H_2O$, 0.09767 g/L $MgSO_4$, 0.4 KCl, 6.4 g/L NaCl, 0.109 g/L NaH_2PO_4, 0.084 g/L L-arginine•HCl, 0.0626 g/L L-cysteine•2HCl, 0.584 g/L L-glutamine, 0.03 g/L glycine, 0.042 g/L L-histidine•HCl•H_2O, 0.105 g/L L-isoleucine, 0.105 g/L leucine, 0.146 g/L L-lysine•HCl, 0.03 g/L L-methionine, 0.066 g/L L-phenylalanine, 0.042 g/L L-serine, 0.095 g/L L-threonine, 0.016 g/L L-tryptophan, 0.10379 g/L L-tyrosine•2Na•2H_2O, 0.094 g/L L-valine, 0.004 g/L $C_5H_{14}ClNO$, 0.004 g/L folic acid, 0.0072 g/L myo-inositol, 0.004 g/L niacinamide, 0.004 g/L D-pantothenic acid, 0004 g/L pyridoxal•HCl, 0.0004 g/L riboflavin, 0.004 g/L thiamine, 4.5 g/L glucose, 0.0159 g/L phenol red, 5.958 g/L HEPES.
	Keratinocyte Growth Medium (KGM)[3]	Media-KGM-Gold™ – catalogue no.: 192060 (Mississauga, ON)

[1]Purchased from Sigma-Aldrich (Oakville, Canada).

[2] Post-supplemented with 10% Fetal Bovine Serum (FBS)

[3]Purchased from Lonza (Mississauga, ON).

S3 – Synthesis Summary of Nanoparticles

Table S2: Relevant precursors, reducing agents and stabilizers with their corresponding concentrations utilized for NP synthesis.

Nanoparticle	Precursor(s) (Concentration)	Reducing Agent (Concentration)	Stabilizing Agent (Concentration)
AgNP	$AgNO_3$ (250 μM)	$NaBH_4$ (1.50 mM)	Aspartame (500 μM)
	$AgNO_3$ (250 μM)	$NaBH_4$ (1.50 mM)	Glucosamine (750 μM)
	$AgNO_3$ (250 μM)	$NaBH_4$ (1.50 mM)	Sucralose (750 μM)
AuNP	$HAuCl_4$ (200 μM)	Aspartame (10.0 mM)	Aspartame (10.0 mM)
	$HAuCl_4$ (200 μM)	Glucosamine (10.0 mM)	Glucosamine (10.0 mM)
	$HAuCl_4$ (200 μM)	Sucralose (50.0 mM)	Sucralose (50.0 mM)
AuNP@Ag	$AgNO_3$/ $HAuCl_4$ (167 μM/ 330 μM)	I-2959 (167 μM)	Aspartame (8.00μM)
	$AgNO_3$/ $HAuCl_4$ (150 μM/ 330 μM)	I-2959 (134 μM)	Glucosamine (16.0 μM)
	$AgNO_3$/ $HAuCl_4$ (167 μM/ 330 μM)	I-2959 (134 μM)	Sucralose (10.6 μM)

S4 – Nanoparticle Stability in Biological Media

Water

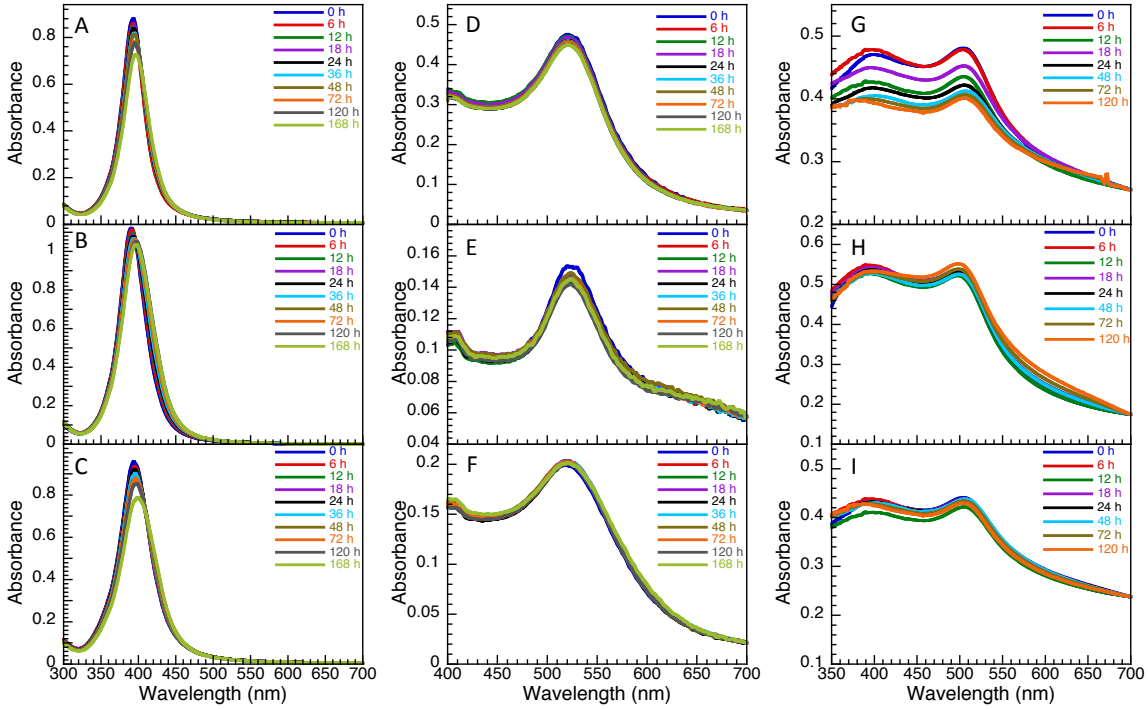

Figure S4.1: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in water (1:3 v/v).

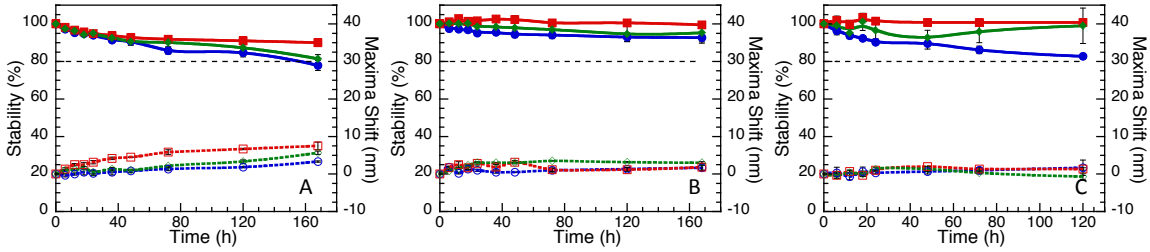

Figure S4.2: Stability curves and plasmon shifts of AgNP (A), AuNP (B) and AuNP@Ag (C) dispersed in water (1:3 v/v).

DPBS

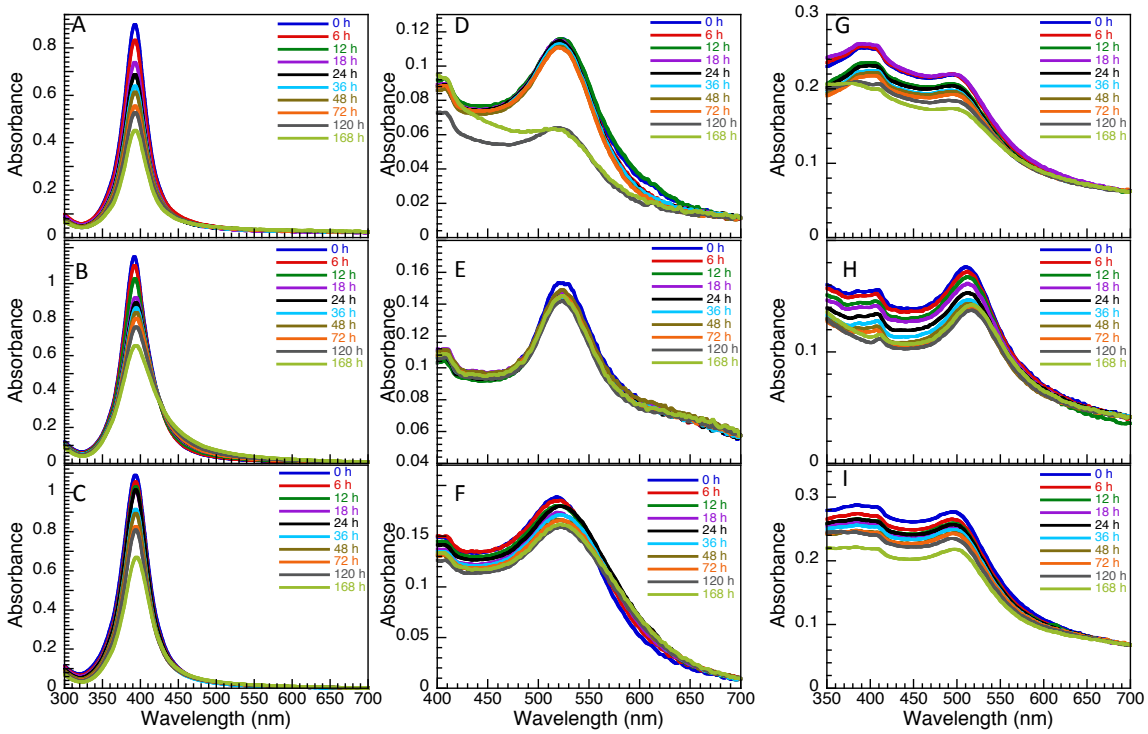

Figure S4.3: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in DPBS (1:3 v/v).

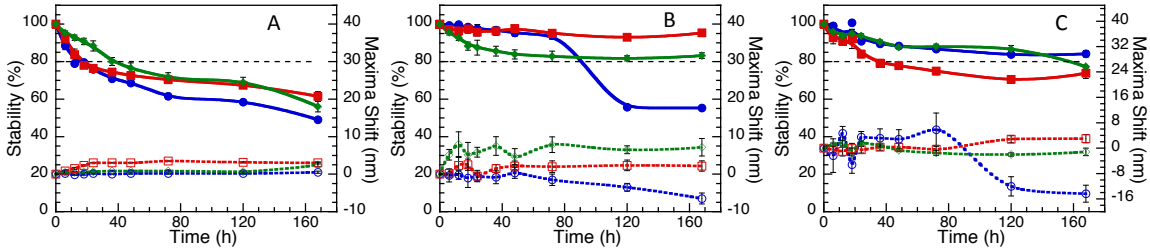

Figure S4.4: Stability curves and plasmon shifts of AgNP (A), AuNP (B) and AuNP@Ag (C) dispersed in DPBS (1:3 v/v)

Saline

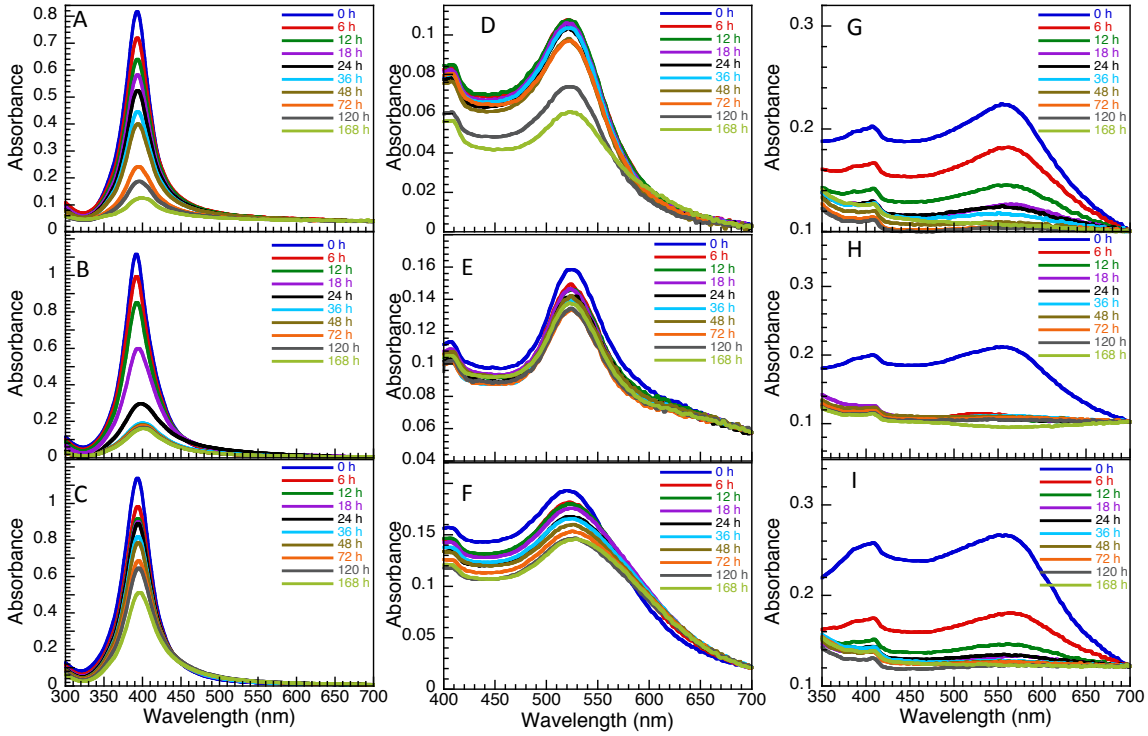

Figure S4.5: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in Saline (1:3 v/v).

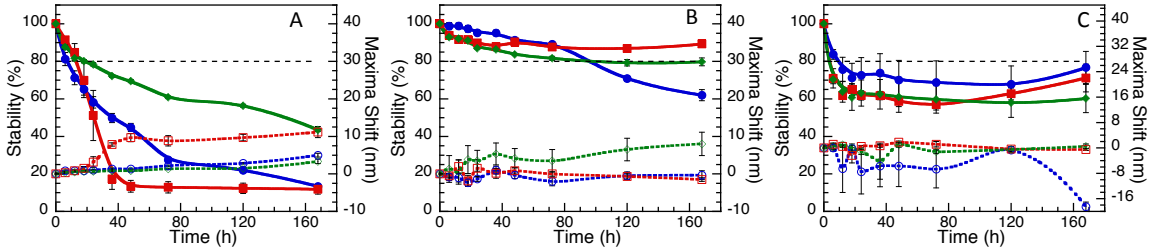

Figure S4.6: Stability curves and plasmon shifts of AgNP (A), AuNP (B) and AuNP@Ag (C) dispersed in saline (1:3 v/v)

HEPES Buffer

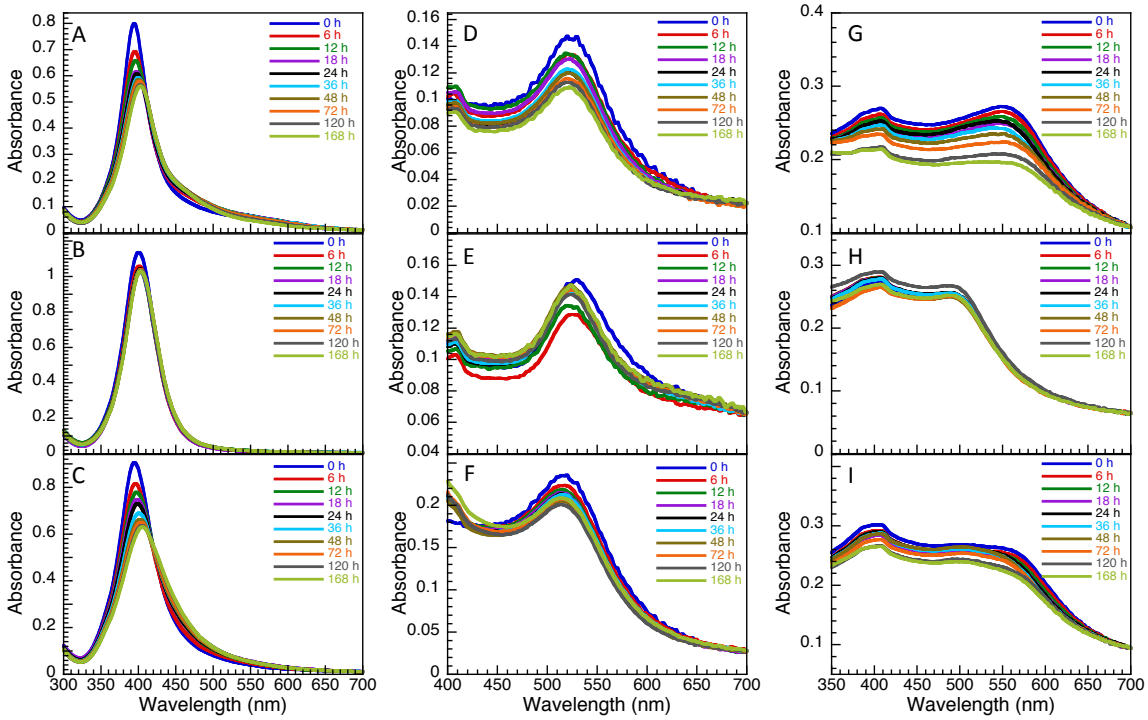

Figure S4.7: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in HEPES buffer (1:3 v/v).

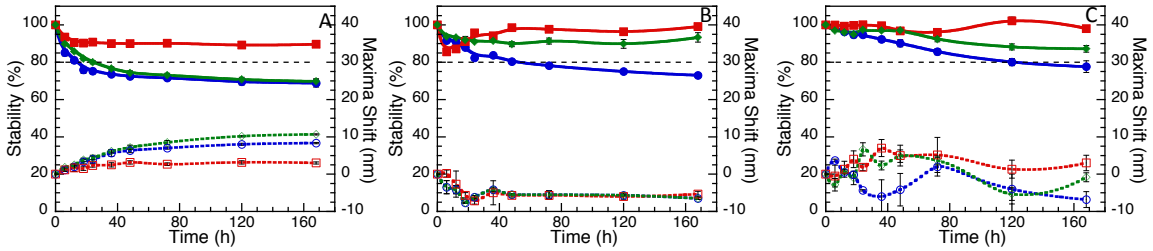

Figure S4.8: Stability curves and plasmon shifts of AgNP (A), AuNP (B) and AuNP@Ag (C) dispersed in HEPES buffer (1:3 v/v)

LB Broth

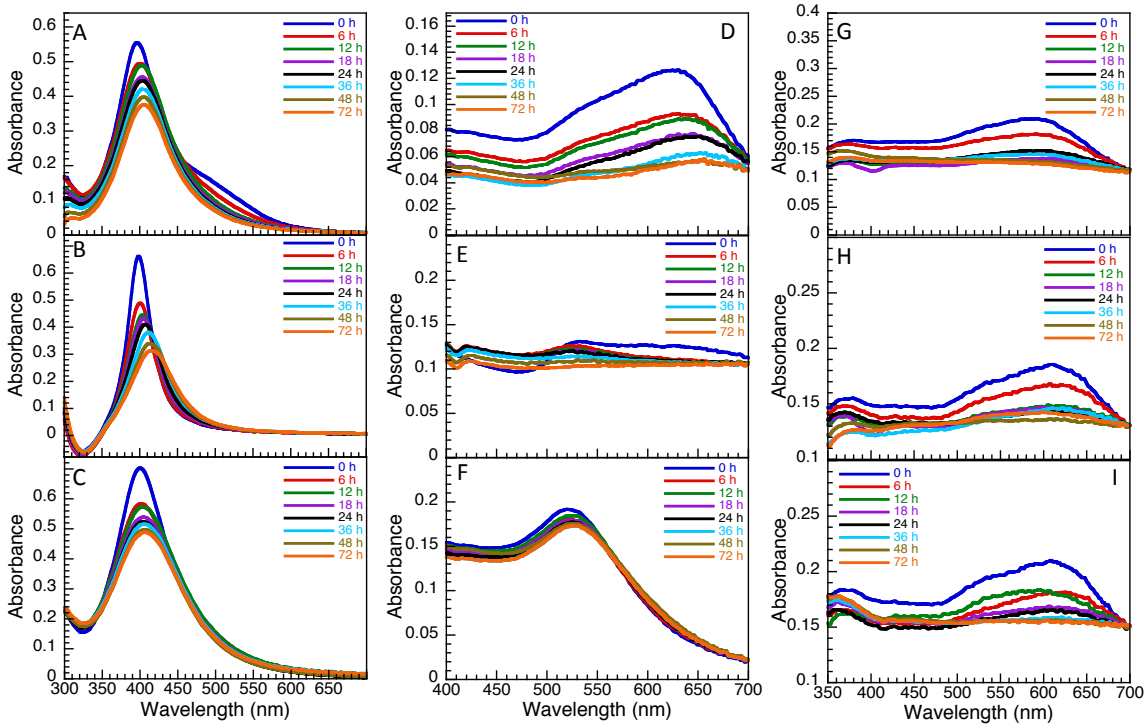

Figure S4.9: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in LB broth (1:3 v/v).

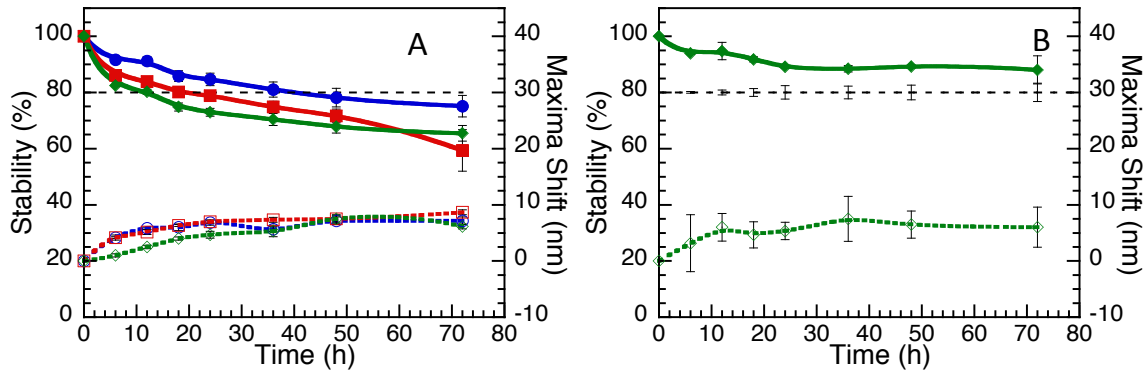

Figure S4.10: Stability curves and plasmon shifts of AgNP (A) and AuNP (B) dispersed in LB broth (1:3 v/v). Stability curves for AuNP@Asp, AuNP@Glu, AuNP@Ag@Asp, AuNP@Ag@Glu and AuNP@Ag@Suc are not shown here due to their instantaneous instability upon mixing.

MH Broth

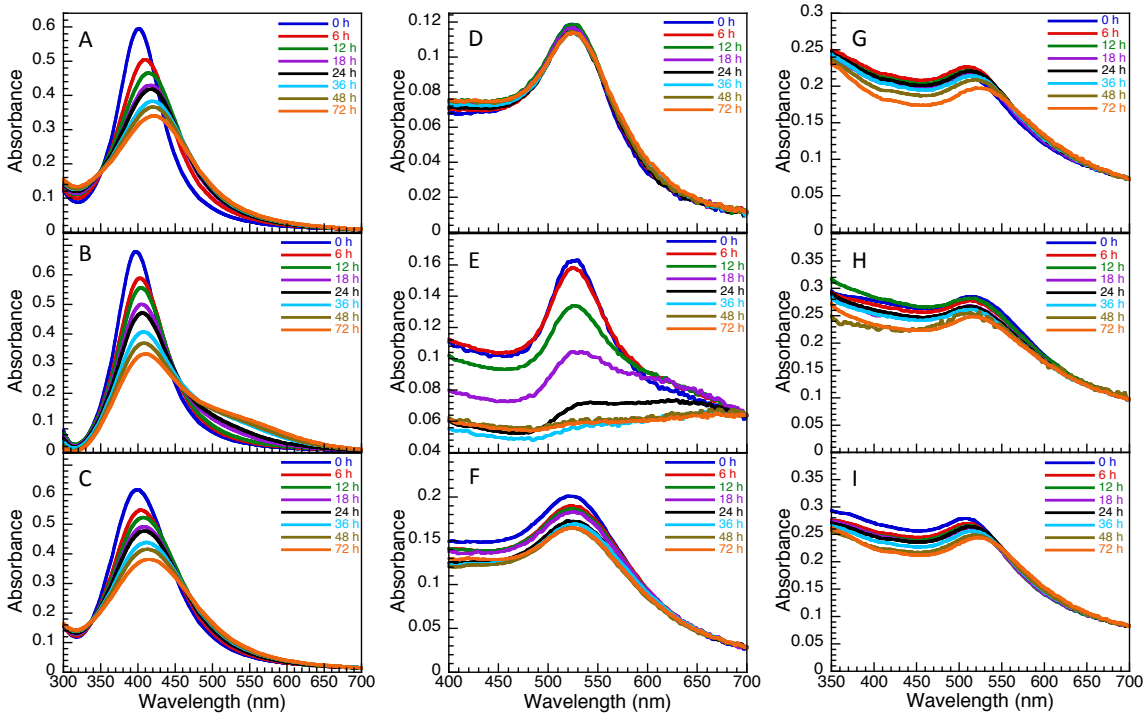

Figure S4.11: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in MH broth (1:3 v/v).

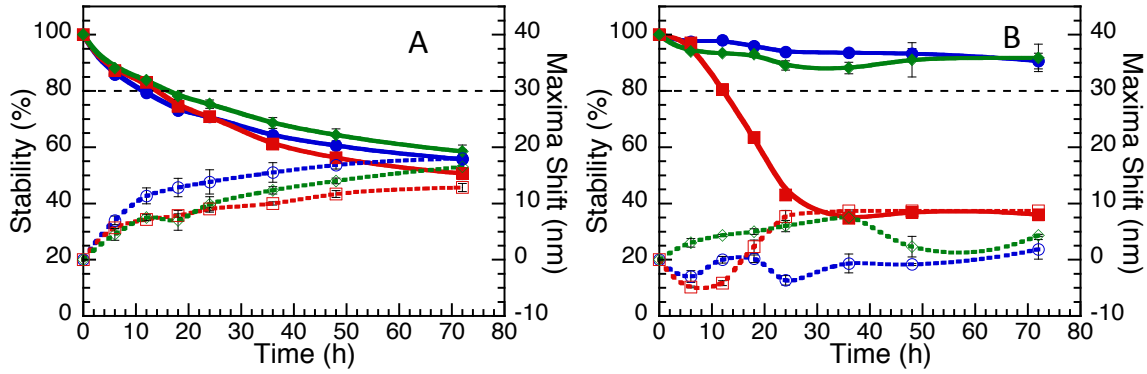

Figure S4.12: Stability curves and plasmon shifts of AgNP (A), AuNP (B) and AuNP@Ag (C) dispersed in MH broth (1:3 v/v). Stability curves for AuNP@Ag@Asp, AuNP@Ag@Glu and AuNP@Ag@Suc are not shown here due to their instantaneous instability upon mixing.

DMEM

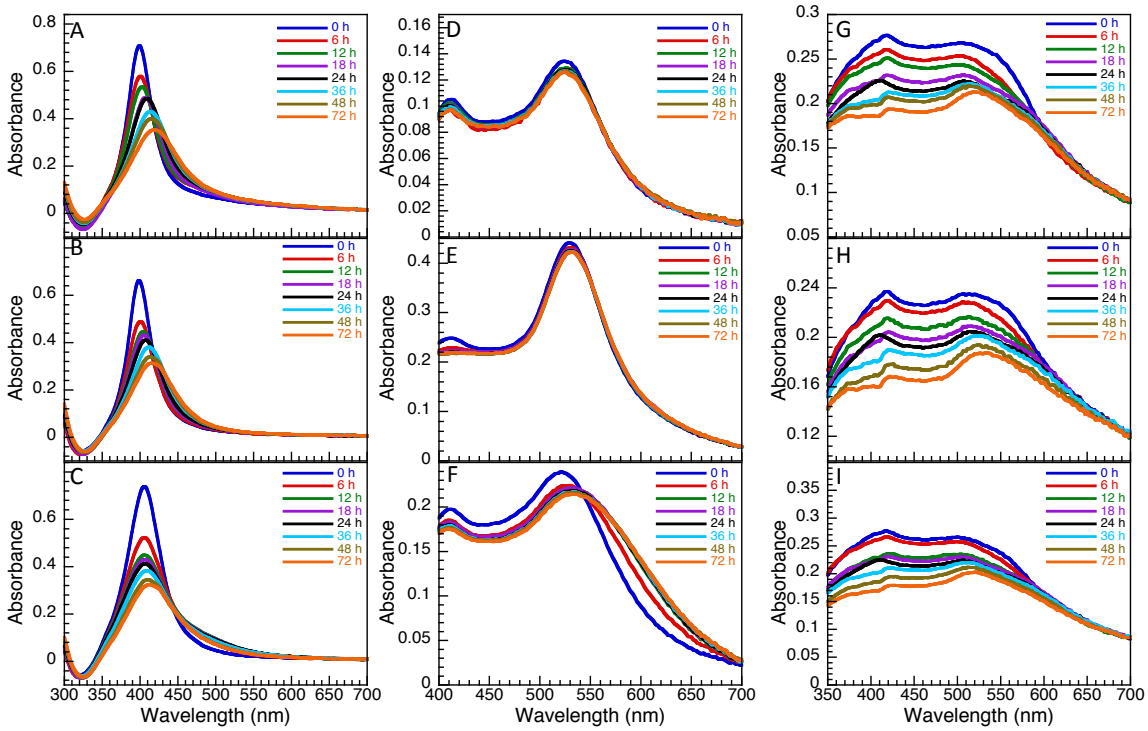

Figure S4.13: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in DMEM (1:3 v/v).

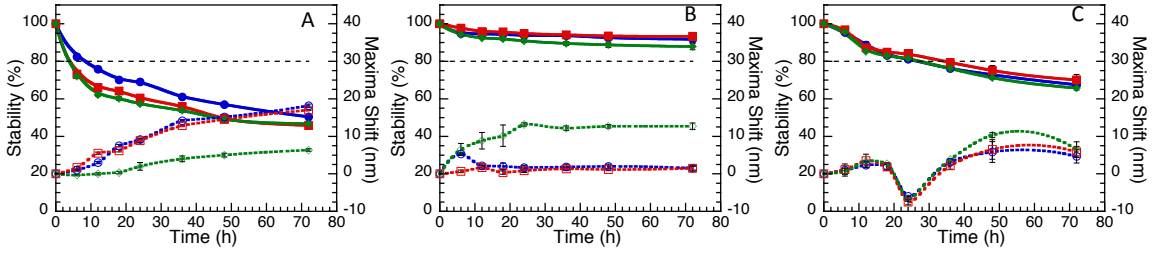

Figure S4.14: Stability curves and plasmon shifts of AgNP (A), AuNP (B) and AuNP@Ag (C) dispersed in DMEM (1:3 v/v).

KBM

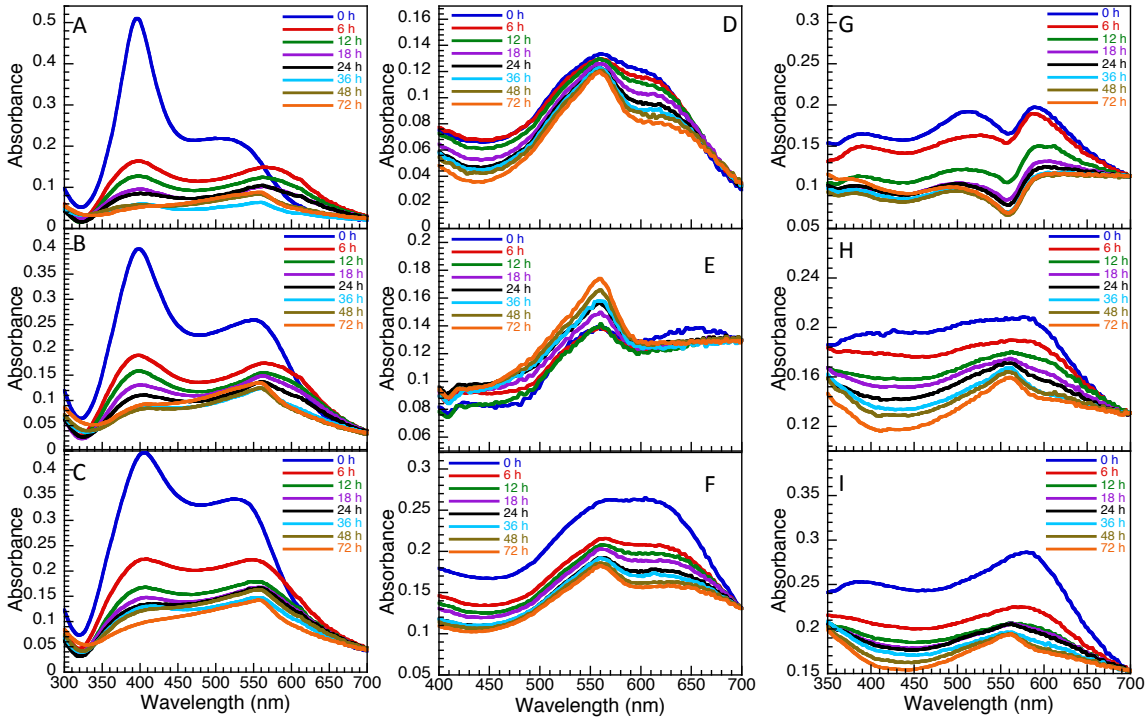

Figure S4.15: Time dependent UV-Vis spectra of AgNP (A-C), AuNP (D-F) and AuNP@Ag (G-I) stabilized with aspartame (A,D,G), glucosamine (B, E, H) and sucralose (C, F, I) dispersed in KBM (1:3 v/v).