Supporting Information for

Preparation of Super-Stable Gold Nanorods via Encapsulation into Block Copolymer Micelles

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Figure S1. Mean hydrodynamic diameter of PEO_{113}-$PnBA_{89}$ BCP micelles in a water/DMF mixture, as a function of w_{water} and time. The shaded area represents a solvent composition window in which the BCP molecules aggregate into metastable colloids, signifying a medium for rapid exchange.

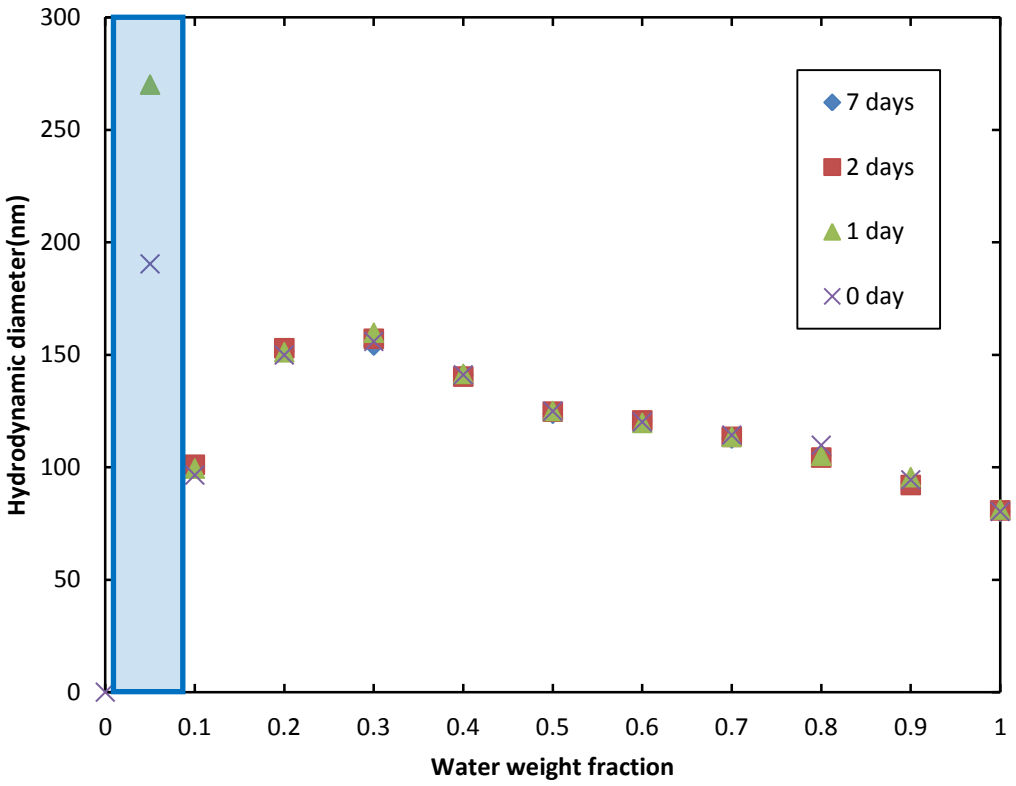
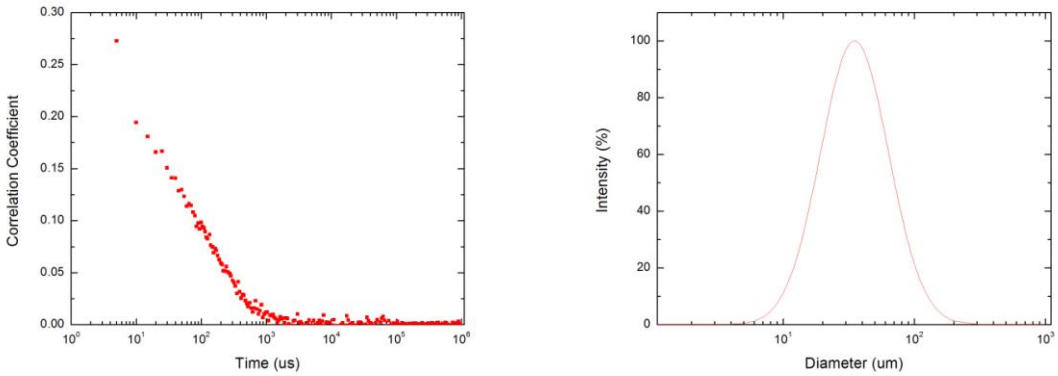


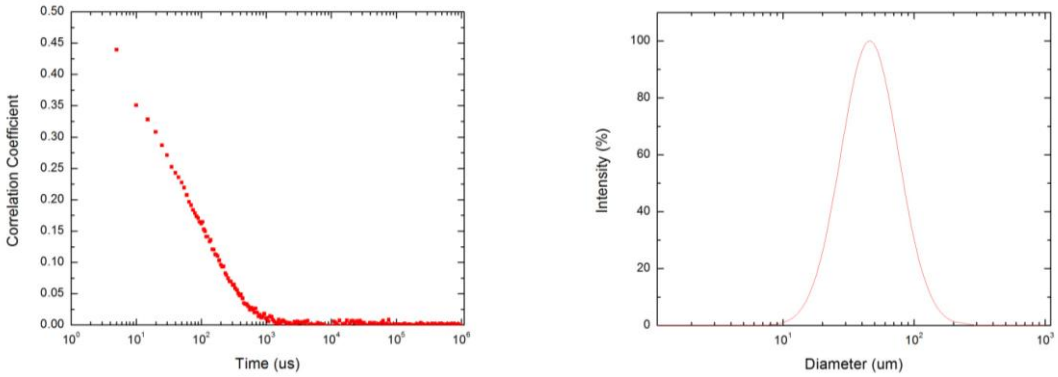
Figure S2. Representative DLS intensity autocorrelation functions and intensity-weighted size distributions (obtained by log-normal analysis) for **(A)** PEO_{113}-$PnBA_{57}$-coated GNRs (prepared by surfactant exchange at w_{water} = 0.35) in pure water (DLS data taken at t = 0, ~3 and ~6 months after preparation), **(B)** PEO_{113}-$PnBA_{57}$-coated GNRs (prepared by surfactant exchange at w_{water} = 0.35) in 150-mM NaCl solution (at t = 0, ~3 and ~6 months after exposure to 150 mM NaCl), and **(C)** CTAB-coated GNRs in 150-mM NaCl solution (at t = 0, 1 and 2 days after exposure to 150 mM NaCl).

(A)

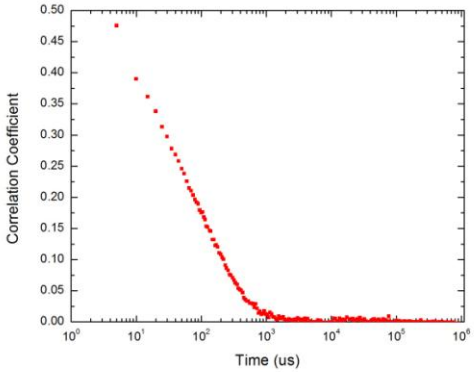
t = 0

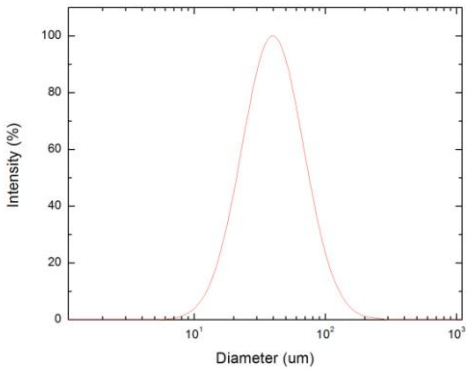


t = ~3 months



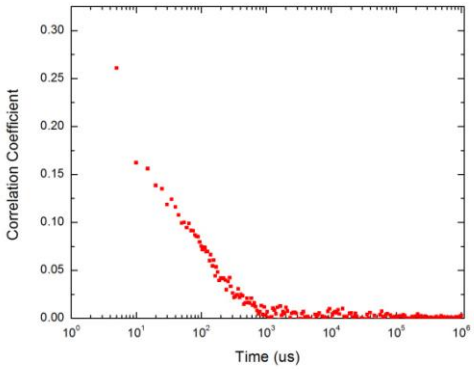
t = ~6 months

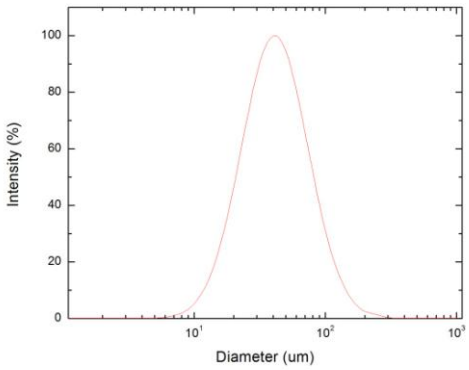




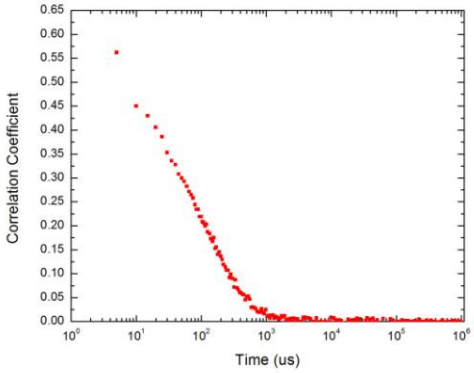
(B)

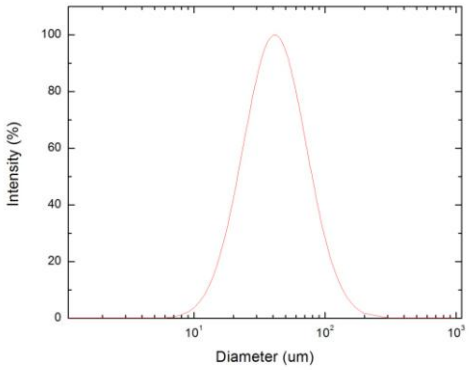
t = 0



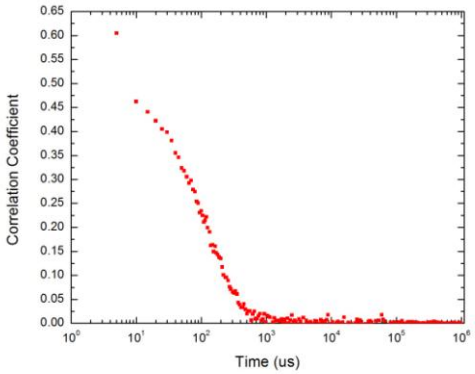


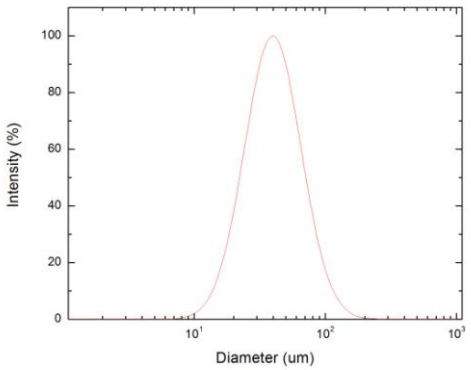
t = ~3 months





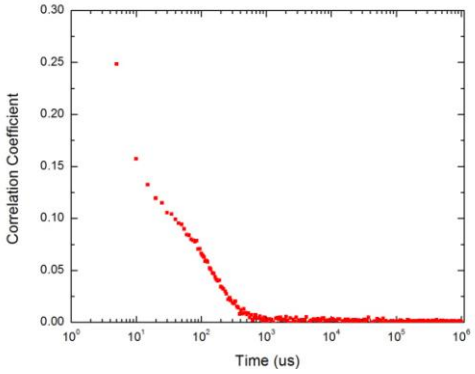
t = ~6 months

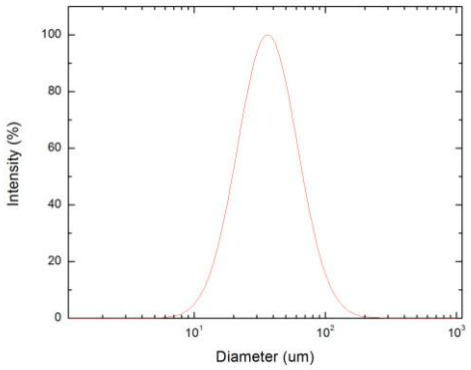




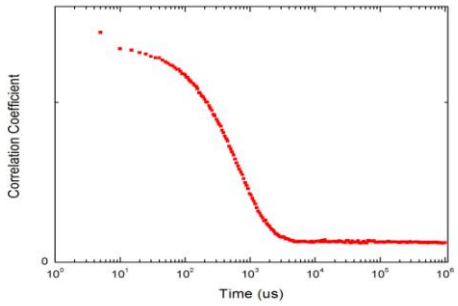
(C)

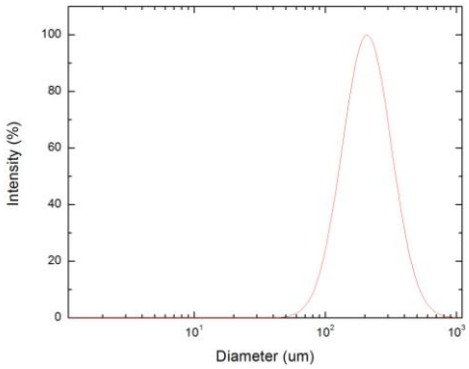
t = 0





t = 1 day


Correlation Coefficient
Time (us)


Intensity (%)
Diameter (um)

t = 2 days

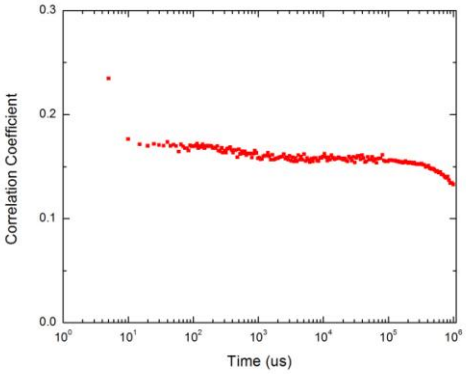
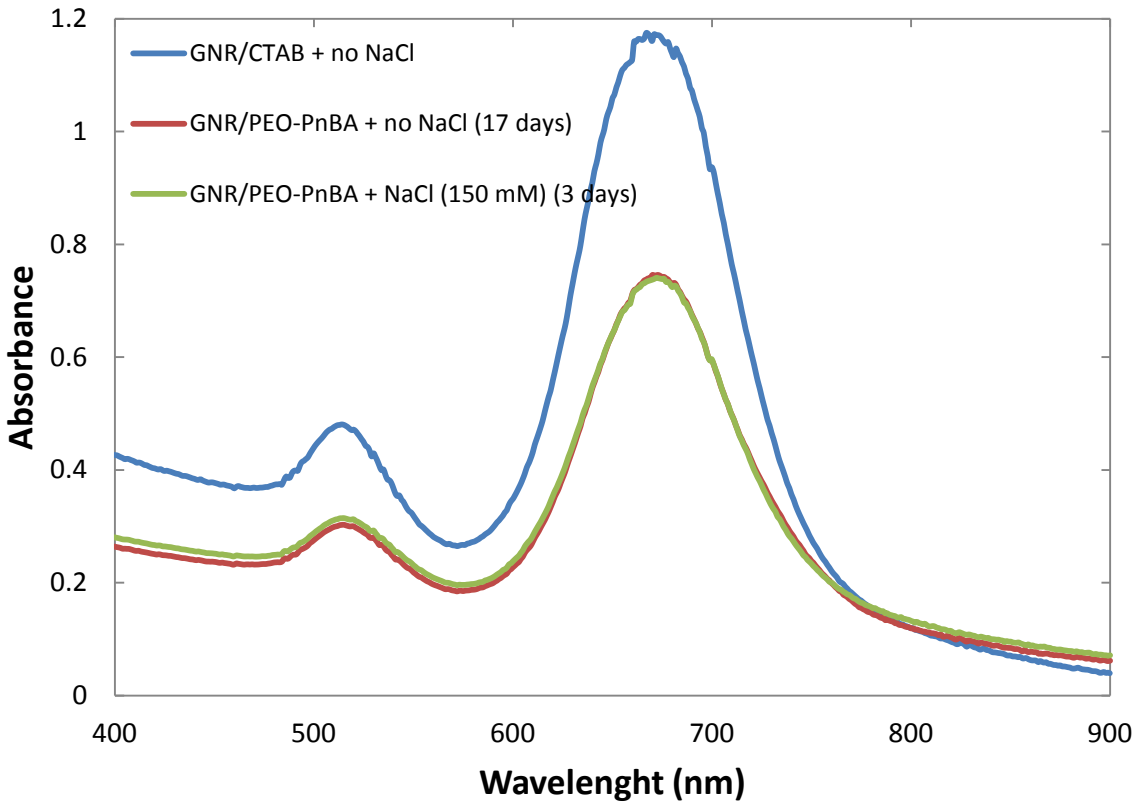

Correlation Coefficient
Time (us)

Figure S3. Representative UV-vis absorption spectra **(A)** for PEO_{113}-$PnBA_{57}$-coated GNRs (prepared by surfactant exchange at w_{water} = 0.35) in pure water (absorbance data taken at t = 17 days after preparation), PEO_{113}-$PnBA_{57}$-coated GNRs (prepared by surfactant exchange at w_{water} = 0.35) in 150-mM NaCl solution (at t = 3 days after exposure to 150 mM NaCl), and CTAB-coated GNRs in pure water (as synthesized), and **(B)** for CTAB-coated GNRs in 150-mM NaCl solution (at t = 0, 1 and 3 days after exposure to 150 mM NaCl).

(A)



(B)

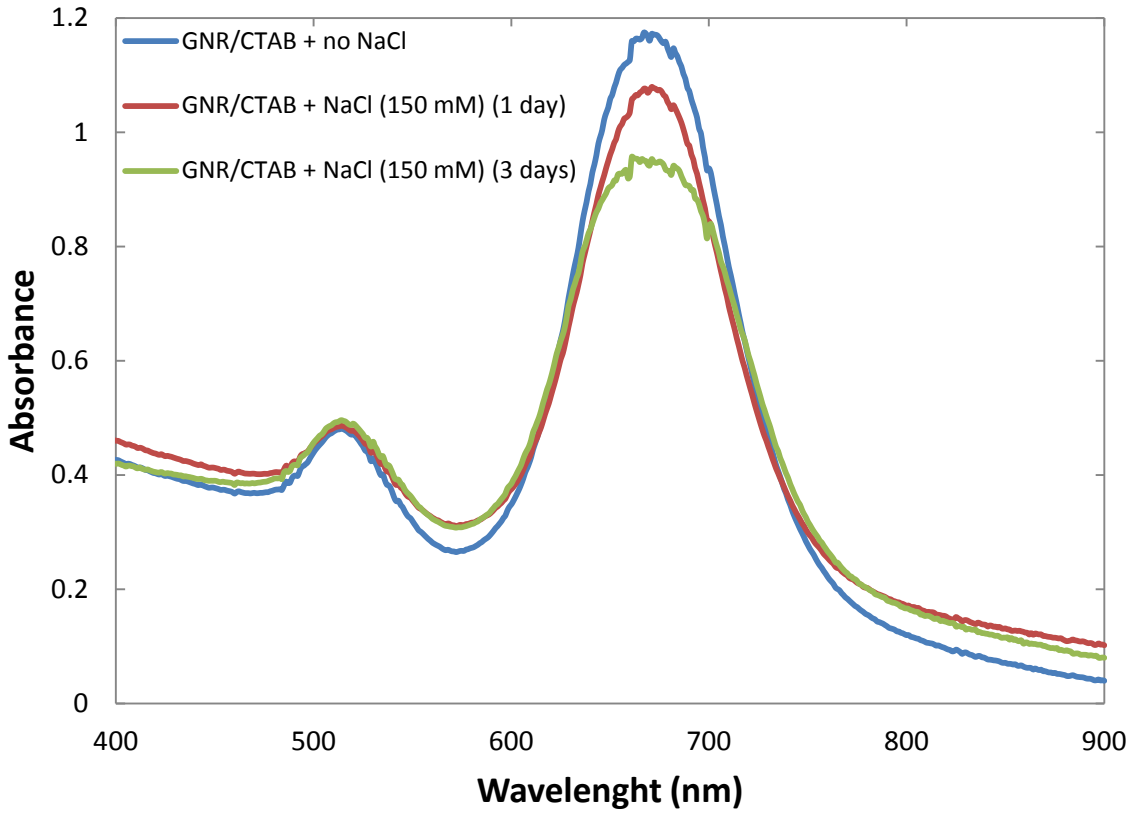

GNR/CTAB + no NaCl
GNR/CTAB + NaCl (150 mM) (1 day)
GNR/CTAB + NaCl (150 mM) (3 days)
Absorbance
1.2
1
0.8
0.6
0.4
0.2
0
400
500
600
700
800
900
Wavelenght (nm)

Figure S4. Additional TEM images of PEO_{113}-$PnBA_{57}$ BCP-coated GNRs (prepared by surfactant exchange at a solvent composition of w_{water} = 0.35) stored in pure water for 17 days after preparation. The TEM specimens were negatively stained with 2% uranyl acetate.

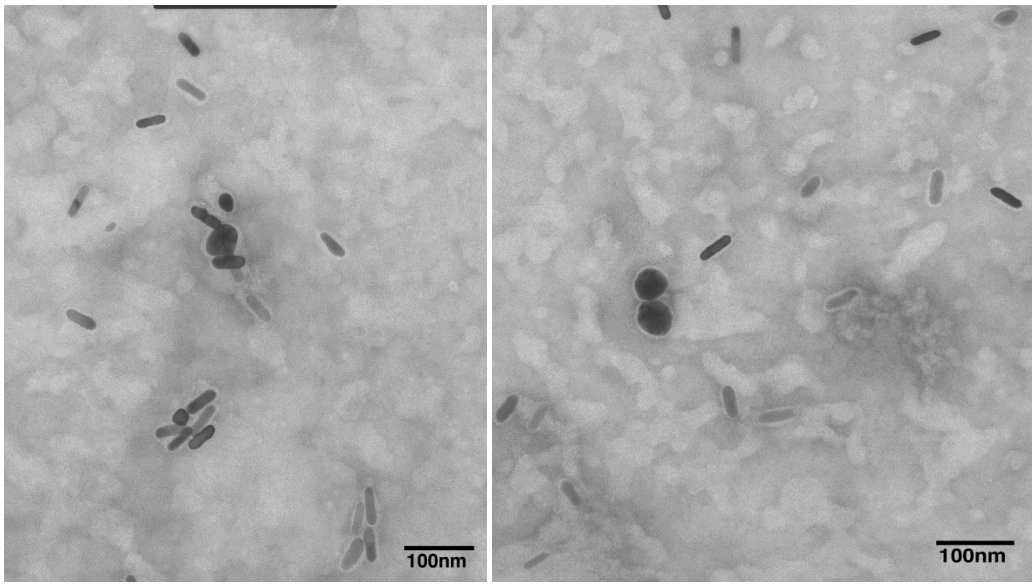
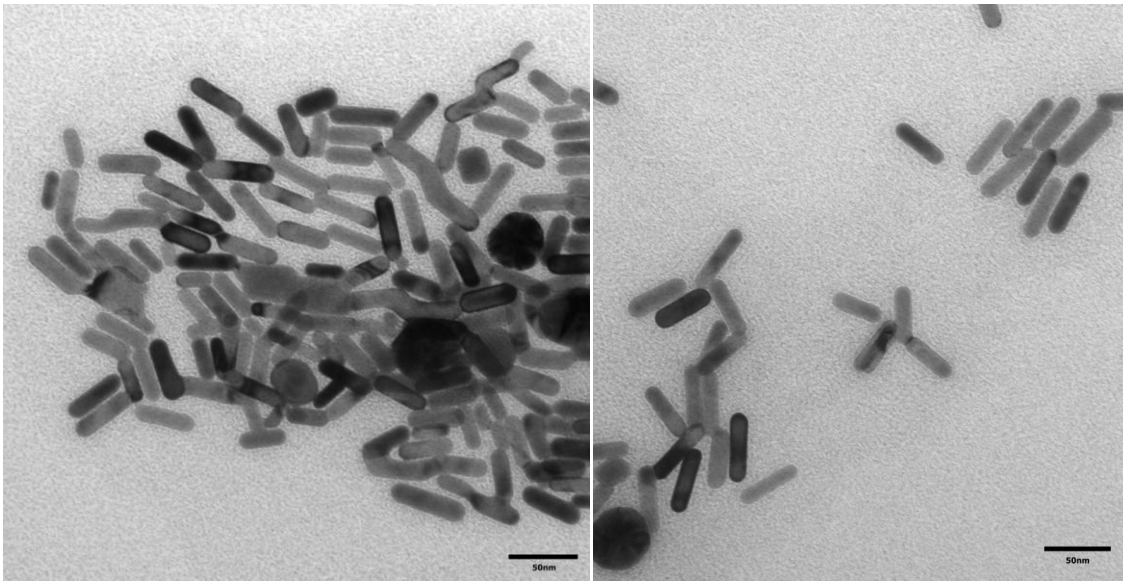


Figure S5. Additional TEM images of CTAB-coated GNRs **(A)** as synthesized in water or **(B)** stored in 150 mM NaCl for 3 days. The TEM specimens were negatively stained with 2% uranyl acetate.

(A)



(B)

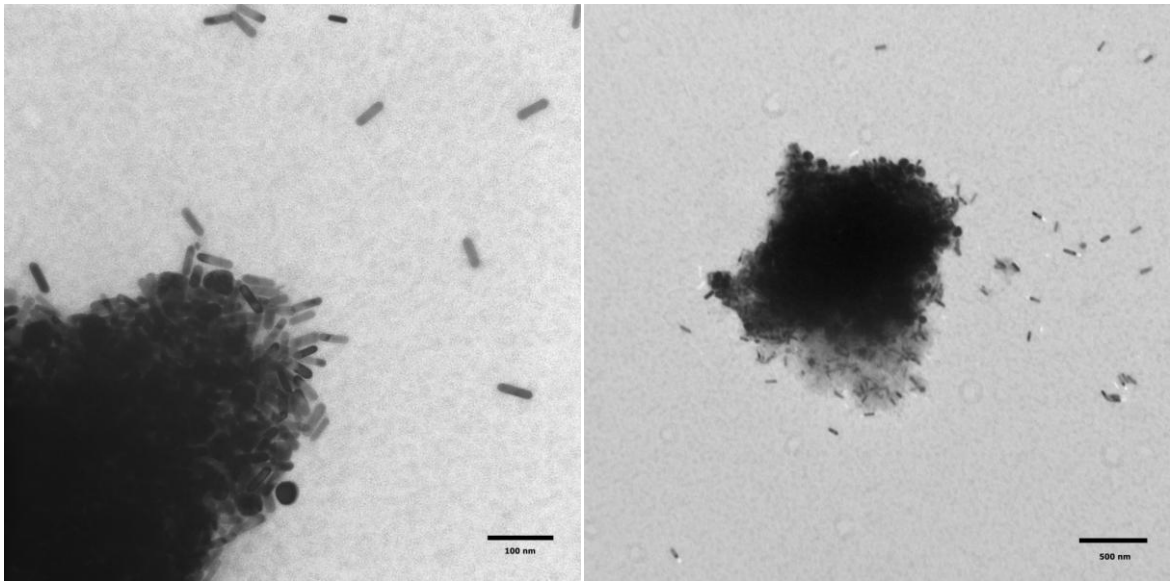


Figure S6. TEM images demonstrating an unsuccessful BCP encapsulation trial conducted at a solvent composition outside the determined range for optimal CTAB exchange (discussed in Section 2.2). In this example, the surfactant exchange process was undertaken with PEO_{113}-$PnBA_{57}$ at a solvent composition of w_{water} = 0.20. The TEM specimens were negatively stained with 2% uranyl acetate. The specific sample preparation procedure used is as follows: A solution containing 0.01 mg/ml GNR (coated with CTAB) was prepared in a water/DMF mixture at w_{water} = 0.40. A 1.0 mg/ml solution of PEO_{113}-$PnBA_{57}$ in pure DMF was also separately prepared. Equal amounts (by weight) of these two solutions were mixed so that the final solvent composition was a water weight fraction of 0.20. The resultant mixture was sonicated for 30 minutes in a bath sonicator. Additional 1.2 g of water was added to make final solvent composition w_{water} = 0.50, again followed by 30 minutes of sonication. The GNR suspension was then dialyzed in a dialysis bag (molecular weight cutoff 3,000) for 2 days against a large volume of deionized water (regularly replaced with fresh water) in order to remove residual DMF and CTAB.

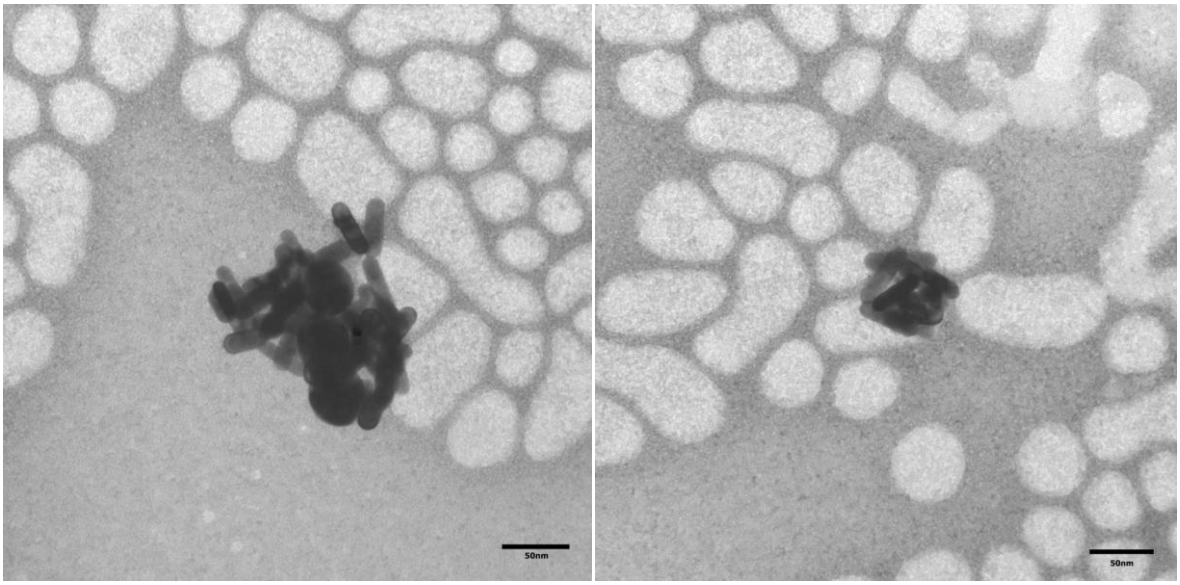


Figure S7. TEM images demonstrating an unsuccessful BCP encapsulation trial conducted at a solvent composition outside the determined range for optimal CTAB exchange (discussed in Section 2.2). In this example, the surfactant exchange process was undertaken with PEO_{113}-$PnBA_{57}$ at a solvent composition of w_{water} = 0.50. The TEM specimens were negatively stained with 2% uranyl acetate. The specific sample preparation procedure used is as follows: A solution containing 0.01 mg/ml GNR (coated with CTAB) was prepared in a water. A 1.0 mg/ml solution of PEO_{113}-$PnBA_{57}$ in pure DMF was also separately prepared. Equal amounts (by weight) of these two solutions were mixed so that the final solvent composition was a water weight fraction of 0.50. The resultant mixture was sonicated for 60 minutes in a bath sonicator. The GNR suspension was then dialyzed in a dialysis bag (molecular weight cutoff 3,000) for 2 days against a large volume of deionized water (regularly replaced with fresh water) in order to remove residual DMF and CTAB.

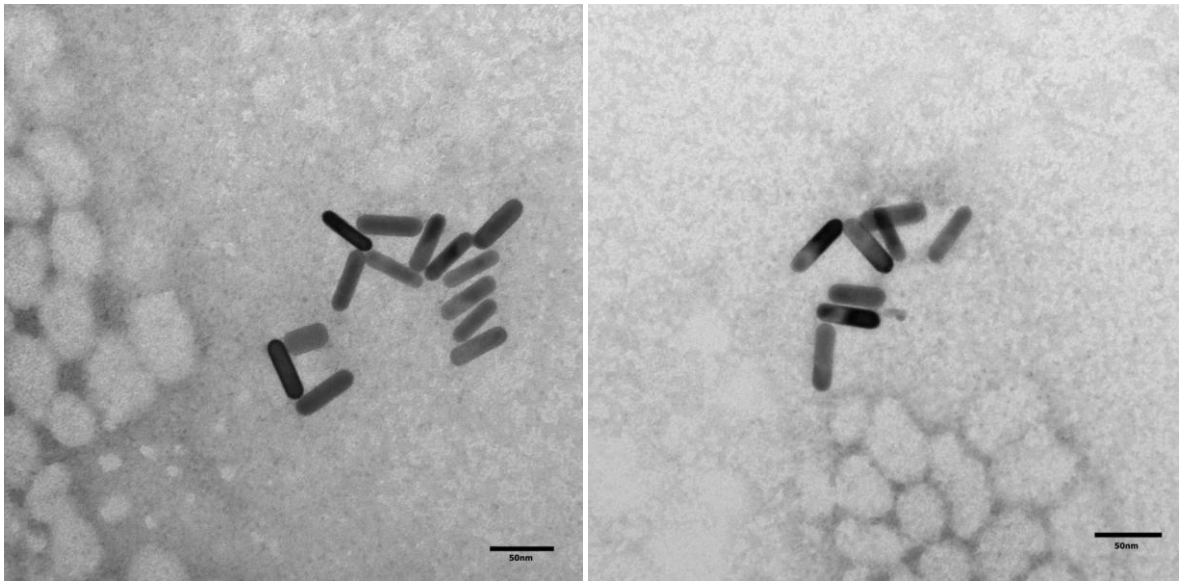


Figure S8. TEM images demonstrating an unsuccessful BCP encapsulation trial conducted at a solvent composition outside the determined range for optimal CTAB exchange (discussed in Section 2.2). In this example, the surfactant exchange process was undertaken with PEO_{113}-$PnBA_{89}$ at a solvent composition of w_{water} = 0.05. The TEM specimens were negatively stained with 2% uranyl acetate. The specific sample preparation procedure used is as follows: A solution containing 0.01 mg/ml GNR (coated with CTAB) was prepared in a water/DMF mixture at w_{water} = 0.10. A 1.0 mg/ml solution of PEO_{113}-$PnBA_{89}$ in pure DMF was also separately prepared. Equal amounts (by weight) of these two solutions were mixed so that the final solvent composition was a water weight fraction of 0.05. The resultant mixture was sonicated for 30 minutes in a bath sonicator. Additional 1.8 g of water was added to make final solvent composition w_{water} = 0.50, again followed by 30 minutes of sonication. The GNR suspension was then dialyzed in a dialysis bag (molecular weight cutoff 3,000) for 2 days against a large volume of deionized water (regularly replaced with fresh water) in order to remove residual DMF and CTAB.