

Electronic Supplementary Information

pH-Controlled Reversible Assembly of Magnetic and Plasmonic Nanoparticles on Gold Nanorods

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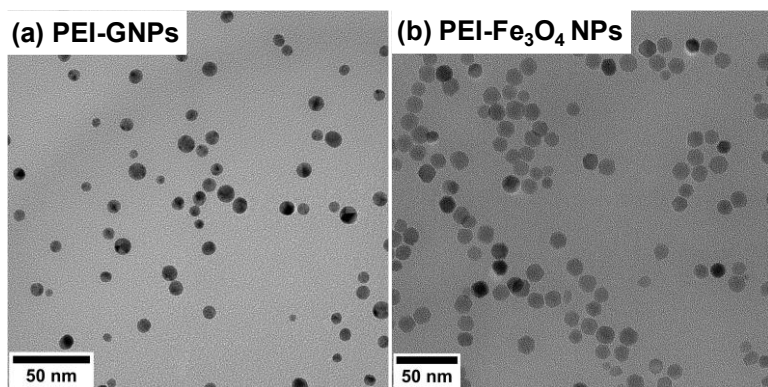


Figure S1. TEM images of (a) PEI-GNPs and (b) PEI-Fe₃O₄ NPs.

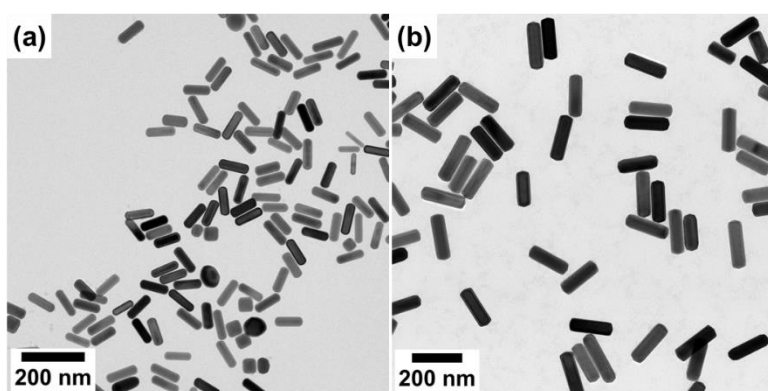


Figure S2. TEM images of BSA-GNRs of two different sizes: (a) 76 nm × 26 nm and (b) 153 nm × 46 nm.

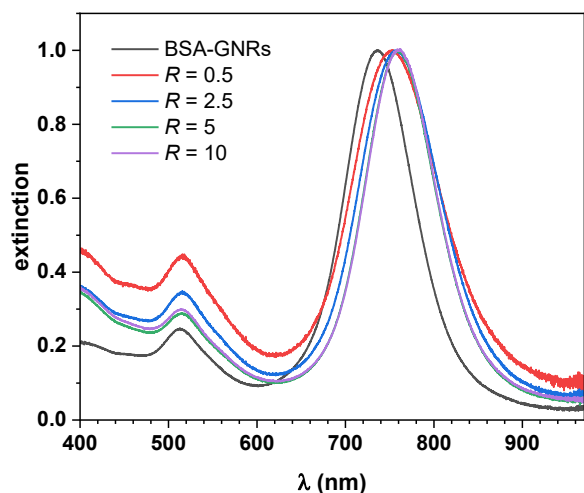


Figure S3. Extinction spectra of purified MagGNRs (normalized at the LSPR maximum) after conducting assembly by mixing equal volumes of BSA-GNRs and PEI-Fe₃O₄ NPs. The concentration of BSA-GNRs was held fixed, and the effects of using four different concentrations of satellite PEI-Fe₃O₄ NPs were investigated. The ratio of the extinctions (R) of the stock solutions $A_{\text{PEI-Fe}_3\text{O}_4 \text{ NPs}}/A_{\text{BSA-GNRs}}$ (at 400 nm) was maintained at $R = 0.5, 2.5, 5$ and 10 , which corresponds to $35, 174, 348$ and 696 PEI-Fe₃O₄ NPs available for assembly per BSA-GNR. A sufficiently high excess of satellite NPs is required to avoid bridging of MagGNRs and broadening of the extinction spectra. Increasing the satellite NPs from 348 to 696 did not further alter the extinction spectra. Based on this result, a concentration of satellite NPs near 350 PEI-Fe₃O₄ NPs per BSA-GNR core was chosen for all other experiments.

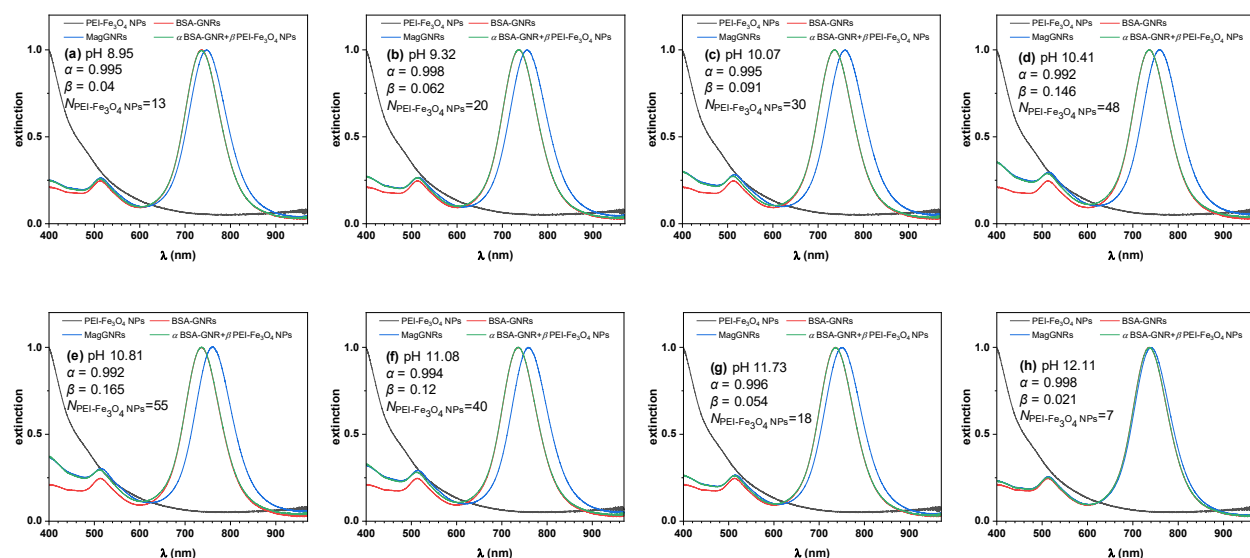


Figure S4. Plots of extinction spectra for MagGNRs, BSA-GNRs, PEI-Fe₃O₄ NPs, and $\alpha A_{\text{BSA-GNRs}} + \beta A_{\text{PEI-Fe}_3\text{O}_4 \text{ NPs}}$ (normalized to 1). The coefficients α and β are used to calculate $N_{\text{PEI-Fe}_3\text{O}_4 \text{ NPs}}$, the average number of PEI-Fe₃O₄ NPs per MagGNR, reported in Figure 1b.

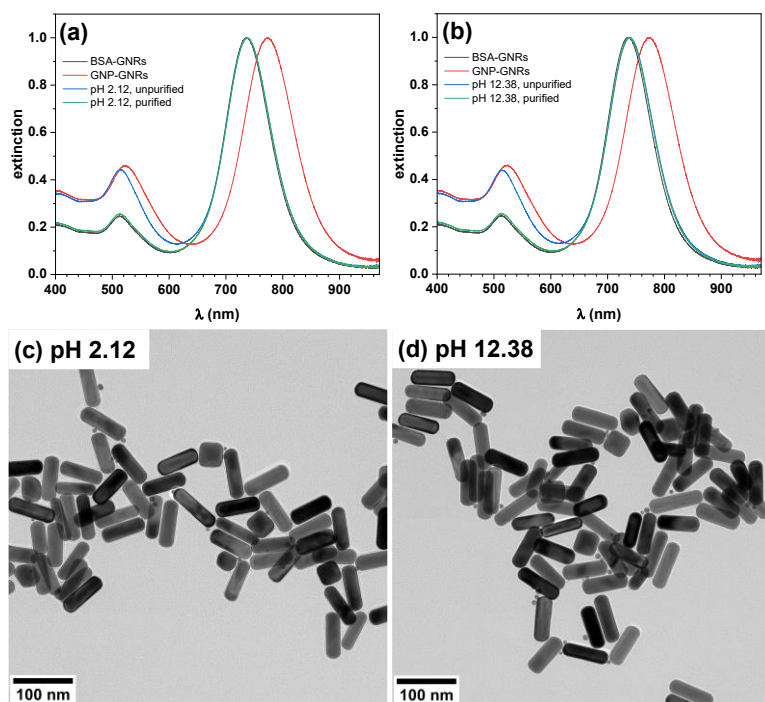


Figure S5. Extinction spectra of BSA-GNRs, GNP-GNRs, and GNP-GNRs (normalized at the LSPR maximum) after adjusting the pH to (a) 2.12 and (b) 12.38 to drive disassembly, with spectra acquired both before and after purification. TEM images of disassembled GNP-GNRs after purification at pH (c) 2.12 and (d) 12.38.

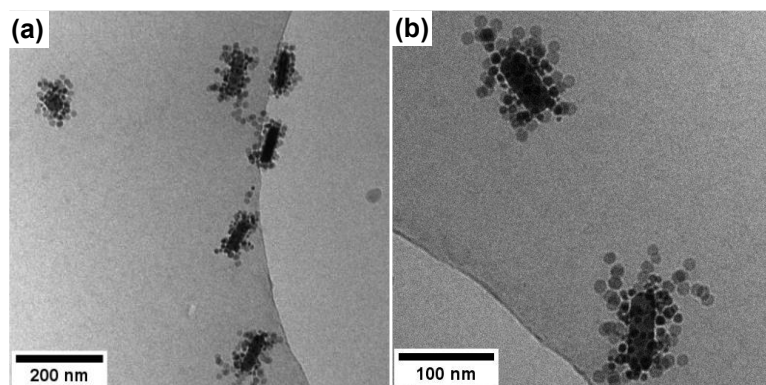


Figure S6. Cryo-TEM images of Fe_3O_4 -GNP-GNRs with an inner layer of GNPs and an outer layer of PEI- Fe_3O_4 NPs at two different magnifications.