

## Electronic Supplementary Information

### **GNP Confinement at the Interface of Cationic Reverse Micelle: Influence in Improving the Lipase Activity**

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**Table S1** Isosbestic point ( $\lambda_{\text{iso}}$ ) and molar extinction co-efficient ( $\epsilon$ ) of *p*-nitrophenol/*p*-nitrophenolate couple in different GNP-doped reverse micelles.

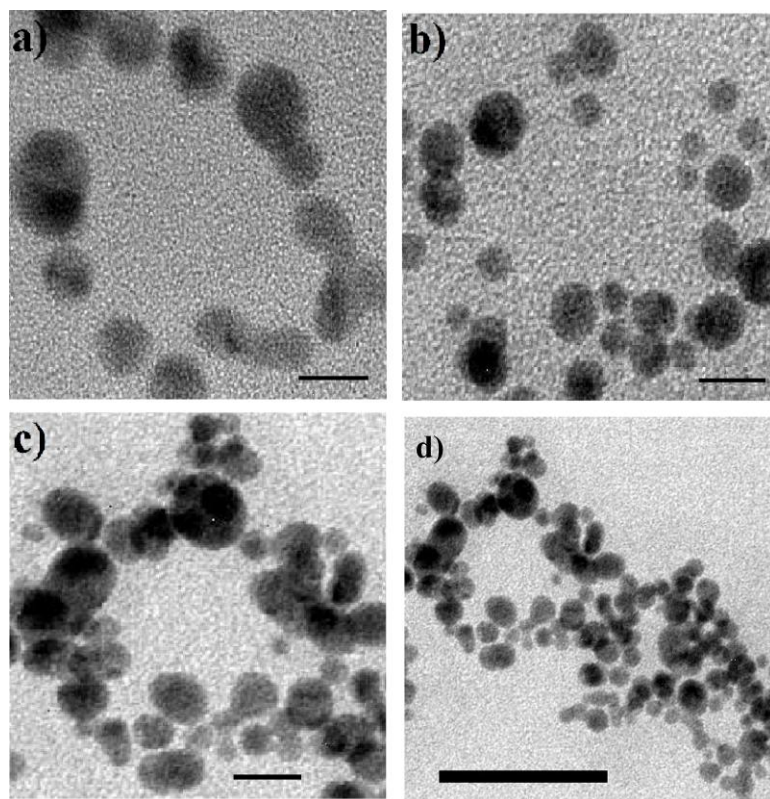
System	[Au] ( $\mu\text{M}$ )	$\lambda_{\text{iso}}$ (nm)	$\epsilon$ values ( $\text{M}^{-1}\text{cm}^{-1}$ )
GNP doped CTAB reverse micelle	0	340	4370
	10	342	4100
GNP doped CTEAB reverse micelle	0	340	4460
	10	342	4360
GNP doped CTPAB reverse micelle	0	338	4558
	10	342	4344

**Table S2** The second-order rate constant  $k_2$  ( $\text{cm}^3\text{g}^{-1}\text{s}^{-1}$ ) of the lipase-catalyzed hydrolysis of *p*-nitrophenyl-*n*-hexanoate in water + 4%EtOH in the presence of GNP<sub>508</sub>, C<sub>12</sub>-thiol and C<sub>6</sub>-dithiol at varying concentrations of thiol.

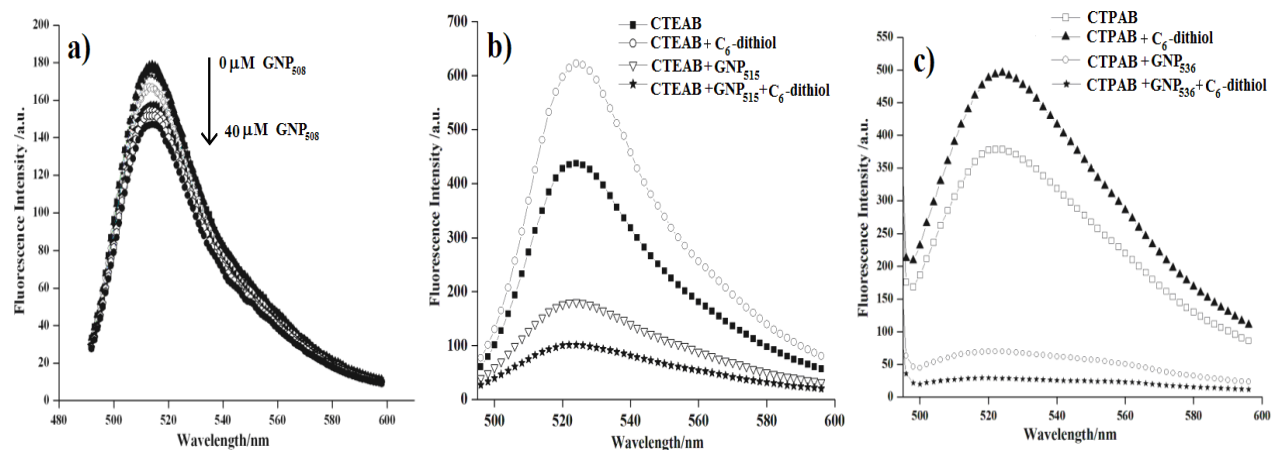
Systems	Conc of GNP <sub>508</sub> ( $\mu\text{M}$ )	Conc of thiol/dithiol ( $\mu\text{M}$ )	$k_2$ ( $\text{cm}^3\text{g}^{-1}\text{s}^{-1}$ ) $\times 10^{-5}$ (C <sub>12</sub> -thiol)	$k_2$ ( $\text{cm}^3\text{g}^{-1}\text{s}^{-1}$ ) $\times 10^{-5}$ (C <sub>6</sub> -dithiol)
Water+4%EtOH	0	0	2.5	2.5
Water+4%EtOH+GNP	10	0	1.8	1.8
Water+4%EtOH+thiol/dithiol	0	10	2.3	2.4
Water+4%EtOH+GNP+thiol/dithiol	10	10	1.8	2.0
”	10	100	2.4	2.5
”	10	200	2.4	2.6
”	10	400	2.8	2.9
”	10	600	2.9	3.0

**Table S3** The second-order rate constant  $k_2$  ( $\text{cm}^3 \text{g}^{-1} \text{s}^{-1}$ ) of the lipase-catalyzed hydrolysis of *p*-nitrophenyl-*n*-octanoate in CTAB, CTEAB and CTPAB reverse micelles in the presence of only GNPs of varying size at  $z=4.8$ ,  $W_0=48$ .

Surfactant	Without GNP and thiol	In presence of GNP (without thiol)		
		GNP <sub>508</sub>	GNP <sub>515</sub>	GNP <sub>536</sub>
CTAB	433±7	482±6	500±7	516±8
CTEAB	582±7	648±7	661±6	689±9
CTPAB	790±7	870±7	928±8	984±9



**Fig. S1** TEM images of GNP<sub>508</sub> in CTAB reverse micelles in presence of a,b) C<sub>12</sub>-thiol, c,d) C<sub>6</sub>-dithiol. Scale bar of a, b, c = 5nm, scale bar of d = 50nm.



**Fig. S2** Fluorescence spectra of sodium salt of fluorescein (Na-FI) within a) water, b) CTEAB and c) CTPAB reverse micelle in presence of  $\text{C}_6$ -dithiol (100  $\mu\text{M}$ ) with varying GNP size at  $z = 6.4$ ,  $W_0 = 44$ .