

## SUPPORTING INFORMATION

### Targeted Delivery of Antibiotic Therapy to Inhibit *Pseudomonas aeruginosa* using Lipid Coated Mesoporous Silica Core-Shell Nanoassembly

Kavini Rathnayake, Unnati Patel, Chi Pham, Anna McAlpin, Travis Budislich, Surangi N. Jayawardena\*

Department of Chemistry, The University of Alabama in Huntsville, Huntsville, AL 35899

#### Synthesis of Col@MSN@LL-(PAB)

PAB was conjugated to the liposomes by EDC activation chemistry. Liposomes containing DSPE-PEG (2000) CA ( $2.25 \times 10^{-1}$  mmol) were activated with EDC (2.25 mmol) and sulfo-NHS (5.6 mmol) for 2 h at 37 °C. Thereafter, PAB (1 mg) was added to the activated liposomes in a molar ratio of 1:10. The mixture was incubated for 24 h at 37 °C. At the end of the incubation period, PAB-modified liposomes (LL-(PAB)) were purified by centrifugation at 12000 rpm for 30 min at 4 °C and resuspended in PBS (pH 7.4). The purified product was lyophilized and stored at -20 °C until further use. To prepare PAB tagged liposome coated Col@MSN (Col@MSN@LL-(PAB)), 50 mg of Col@MSN was resuspended in PAB modified liposomes (LL-(PAB)) (2 mL) in PBS and mixed for 20 min on an ice bath. Col@MSN@LL-(PAB) particles were separated from empty liposomes by centrifugation at 12000 rpm for 5 min and repeated (3x) washing in PBS. The resultant Col@MSN@LL-(PAB) was lyophilized and dried at -20 °C until further use.

Table S1. Hydrodynamic size, dried size distribution and the zeta potential of nanoassemblies

Material	Hydrodynamic diameter (nm) from DLS	Diameter from TEM (nm)	Zeta potential (mV)
SNP	98 ± 4 (PDI 0.1)	N/A	-38 ± 2.3
Col@SNP	101 ± 2.1 (PDI 0.2)	N/A	-8 ± 0.8
MSN	300 ± 9 (PDI 0.4)	80 ± 9	-30 ± 1.5
Col@MSN	380 ± 7.9 (PDI 0.5)	85 ± 5	+5.0 ± 1.1
Col@MSN@LL	500 ± 9.6 (PDI 0.5)	98 ± 1.6	+2.5 ± 1.2
Col@MSN@LL- (LL37)	620 ± 10.6 (PDI 0.7)	125 ± 3.4	+10.2 ± 2.9
Colistin (Col)	N/A	N/A	+10 ± 0.9

Table S2. Table of surface area, pore volume and pore size data of MSN and Col@MSN from BET analysis

	MSN	Col@MSN
Surface area (MultiPoint BET)	8.808e+02 m <sup>2</sup> /g	6.464e+02 m <sup>2</sup> /g
Pore volume (BJH method)	2.416e+00 cm <sup>3</sup> /g	1.372e+00 cm <sup>3</sup> /g
Pore size (BJH method)	1.809e+01 Å	1.181e+01 Å

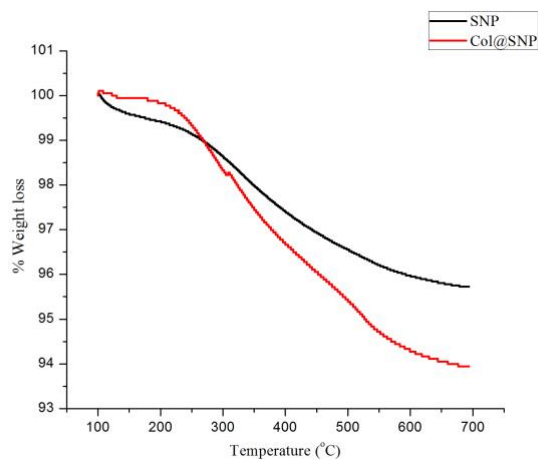


Figure S1. TGA curve for SNP and Col@SNP

Equation S1. Equations used for the calculations of EE% and LC%.

$$EE\% = \frac{\text{total mass of drug added} - \text{mass of unencapsulated drug}}{\text{total mass of drug added}} \times 100$$

$$LC\% = \frac{\text{total mass of drug added} - \text{mass of unencapsulated drug}}{\text{total mass of MSNs}} \times 100$$

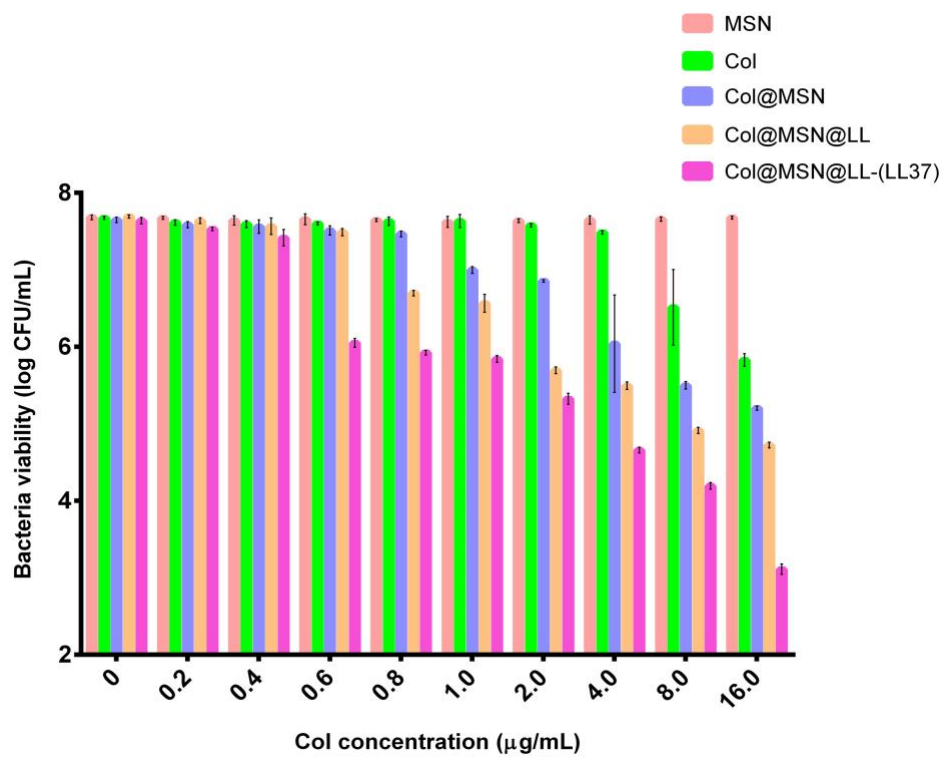


Figure S2. Quantitative antibacterial tests were performed against the PA14 on 96-well plates containing a standard Col concentration in each and every nanoassembly.