

## Electronic Supporting Information

### A direct method for the preparation of glycolipid-metal nanoparticle conjugates: sophorolipids as reducing and capping agents for the synthesis of water redispersible silver nanoparticles and their antibacterial activity

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**ESI-1: Preparation and characterization of acid sophorolipid:** Was prepared according to the reported procedures.<sup>1</sup>

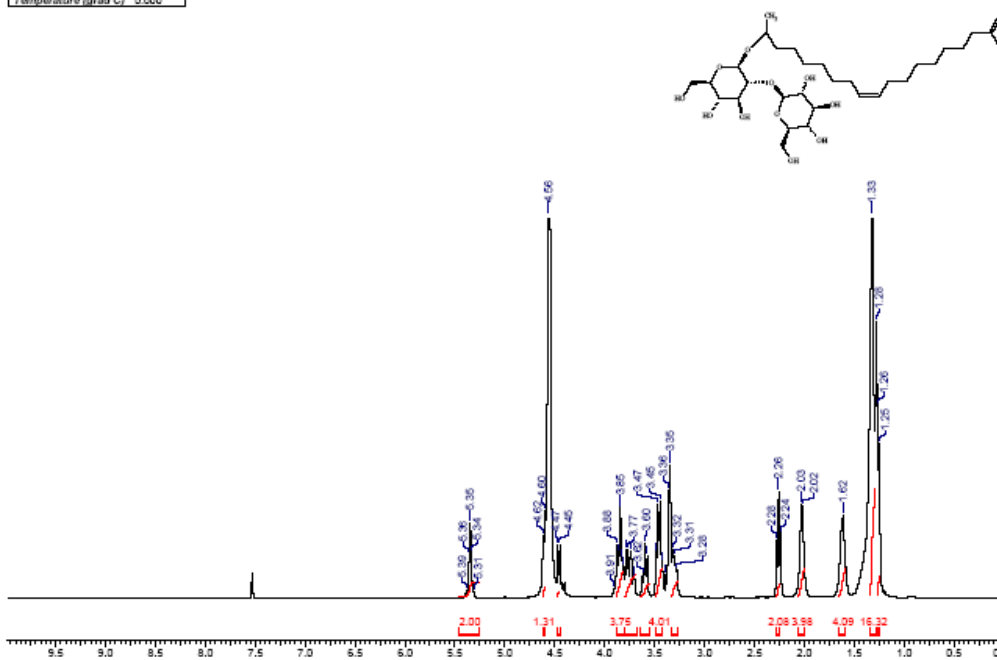
$[\alpha]_D^{25} = -12.5$  (c = 0.1 g/mL) lit.<sup>1b</sup>:  $[\alpha]_D^{25} = -12.8$  (c = 0.0104 g/mL). <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>-CD<sub>3</sub>OD):  $\delta$  1.25 (d, J = 6.2 Hz, 3H), 1.28–1.46 (m, 16H), 1.57–1.64 (m, 4H), 2.0–2.04 (m, 4H), 2.26 (t, J = 7.5 Hz, 1H), 3.28–3.28 (m, 1H), 3.28–3.49 (m, 5H), 3.56–3.62 (m, 2H), 3.70–3.78 (m, 3H), 3.81–3.88 (m, 3H), 4.46 (d, J = 7.8 Hz, 1H), 4.61 (d, J = 7.8 Hz, 1H), 5.31–5.39 (m, 2H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>-CD<sub>3</sub>OD):  $\delta$  22.1 (q), 26.4 (t), 26.7 (t), 28.3 (t), 30.3 (t), 30.4 (t), 30.5 (t), 30.7 (t), 30.8 (t), 30.9 (t), 36.7 (t), 37.8 (t), 62.8 (t), 63.1 (t), 71.4 (d), 71.7 (d), 75.6 (d), 77.5 (d), 77.6 (d), 77.9 (d), 78.1 (d), 78.9 (d), 82.1 (d), 102.5 (d), 104.7 (d), 130.9 (2d), 179.9 (s). MS (ESI): m/z = 645.47 (100%, [M+Na]<sup>+</sup>); 661.45 (52%, [M+K]<sup>+</sup>). Anal. Calcd for C<sub>30</sub>H<sub>54</sub>O<sub>13</sub>: C, 57.86; H, 8.74. Found: C, 57.60; H, 9.05.

1. a) *Preparation*: Zhou, S.; Xu, C.; Wang, J.; Gao, W.; Akhverdiyeva, R.; Shah, V.; Gross, R. *Langmuir*, **2004**, *20*, 7926.  
b) *Hydrolysis*: Rau, U.; Heckmann, R.; Wray, V.; Lang, S. *Biotechnol. Lett.* **1999**, *21*, 973.  
c) *Detailed spectral and analytical data*: Azim, A.; Shah, V.; Doncel, G. F.; Peterson, N.; Gao, W.; Gross, R. *Bioconj. Chem.* **2006**, *17*, 1523.

### **1H NMR OF SOPHOROLIPID**

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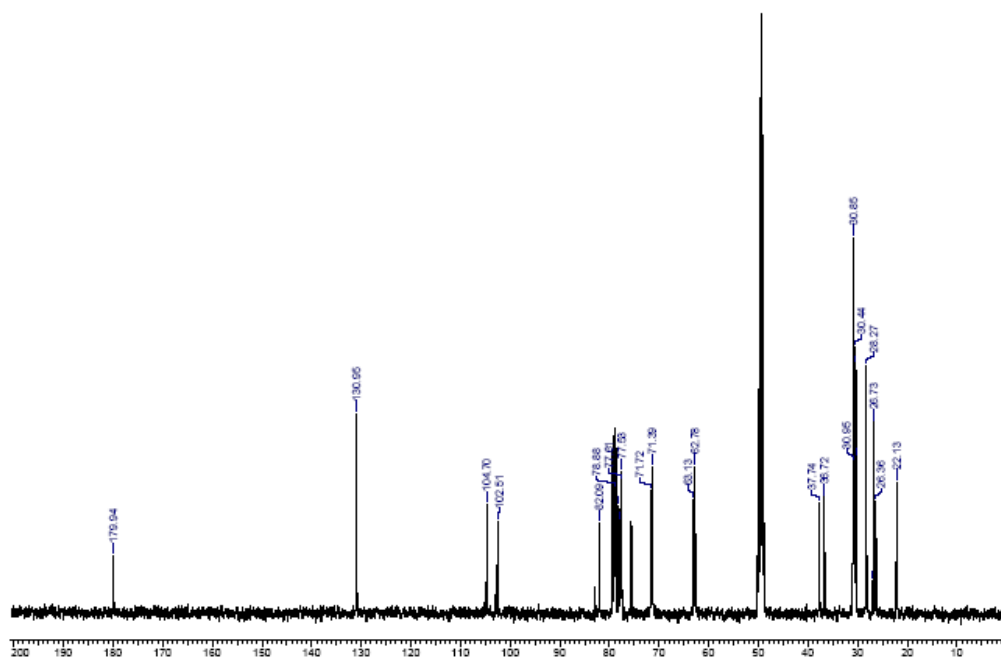
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| Frequency (MHz)        | 400.13 | Nucleus | <sup>1</sup> H | Original Points Count | 32768               | Points Count | 32768 | Sweep Width (Hz) | 8223.68 |
| Temperature (grad C)   | 0.000  |         |                |                       |                     |              |       |                  |         |

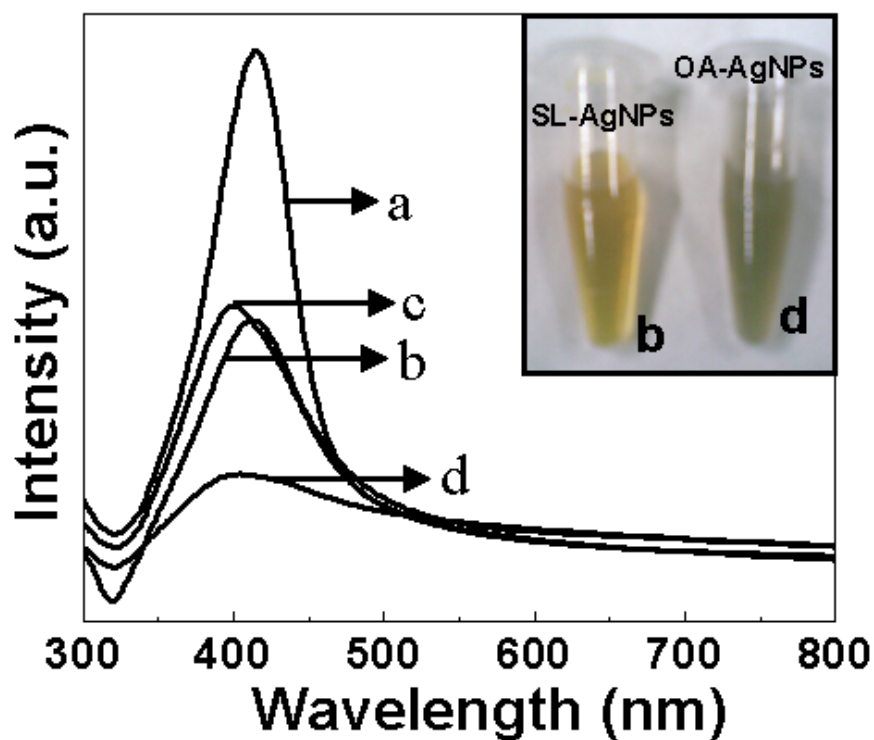
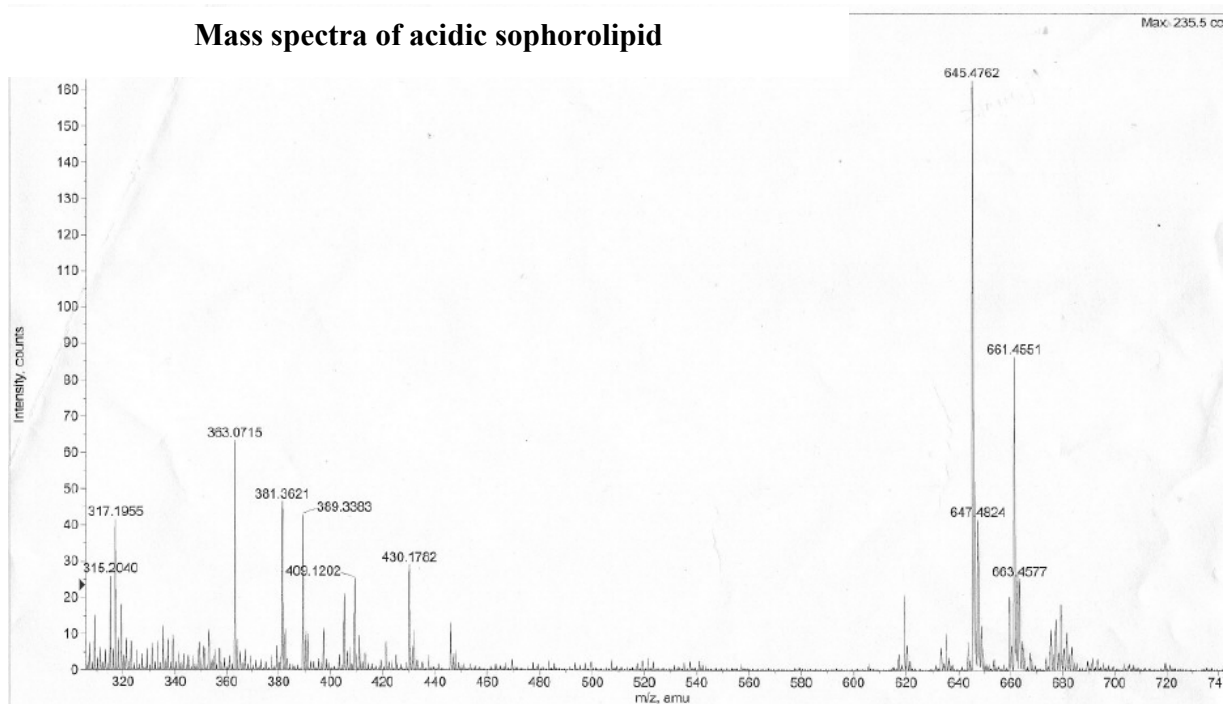


### **13C NMR OF SOPHOROLIPID**

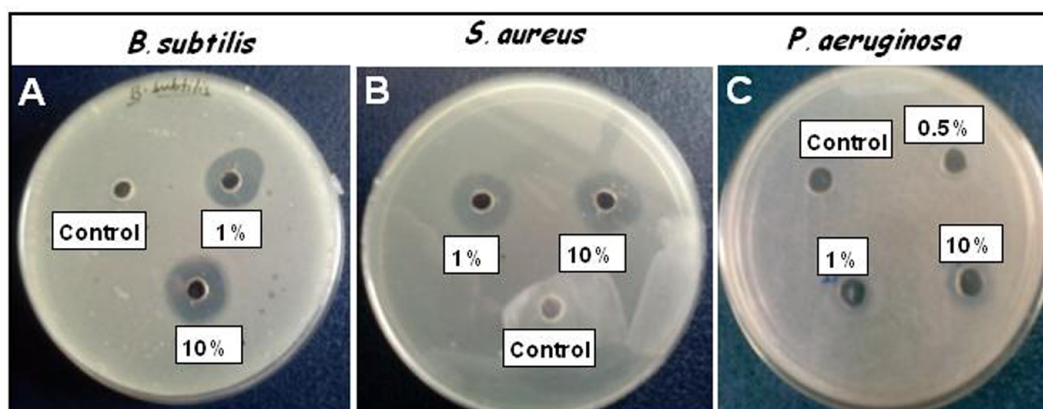
21 Sep 2007

|                        |        |              |                     |                  |          |                      |                 |
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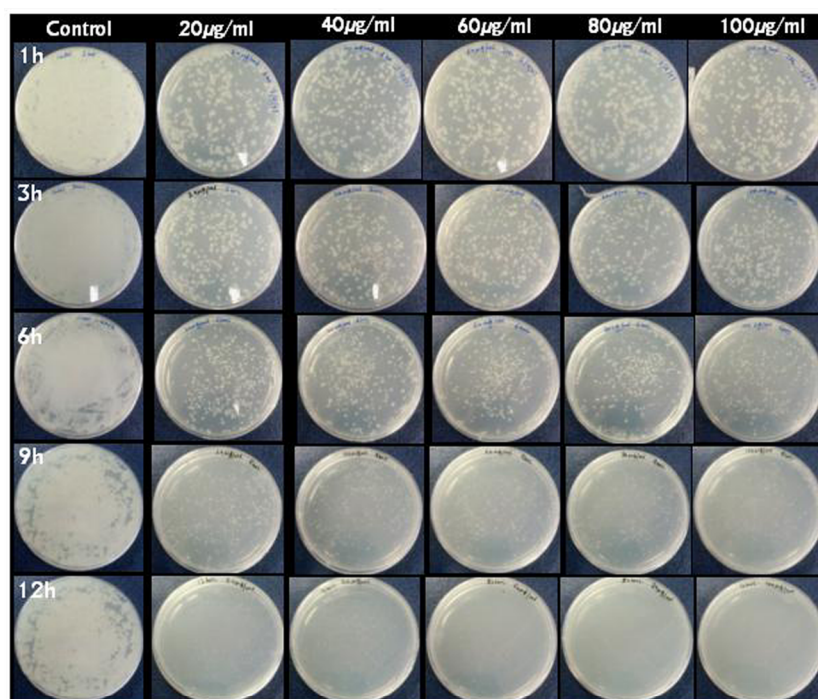




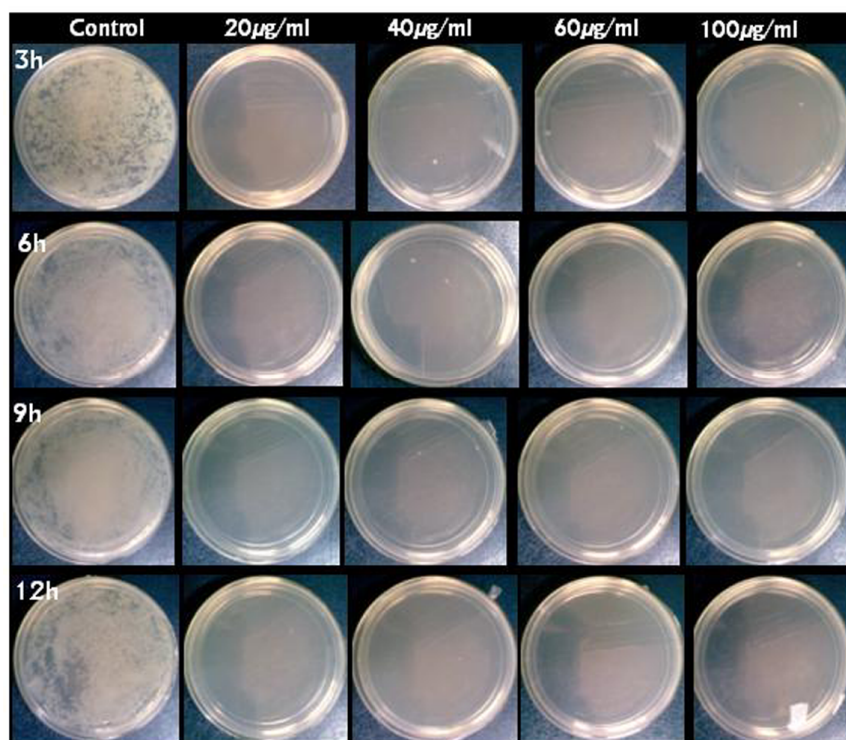
**ESI-Fig-1:** UV-vis spectra of SL-AgNPs (curve-a), OA-AgNPs (curve-b), redispersed SL-AgNPs (curve-c) and redispersed OA-AgNPs (curve-d). Inset shows the corresponding colour of redispersed SL-AgNPs (vial-c) and OA-AgNPs (vial-d).



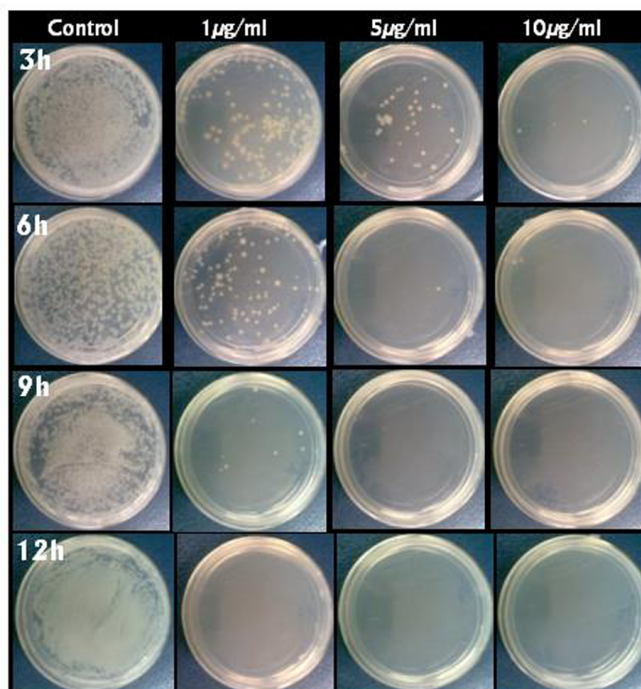
**ESI-Fig-2:** Luria-Agar plates showing antibacterial activity of different concentrations of pure sophorolipid against *B. subtilis* (plate-A), *S. aureus* (plate-B) and *P. aeruginosa* (plate-C).



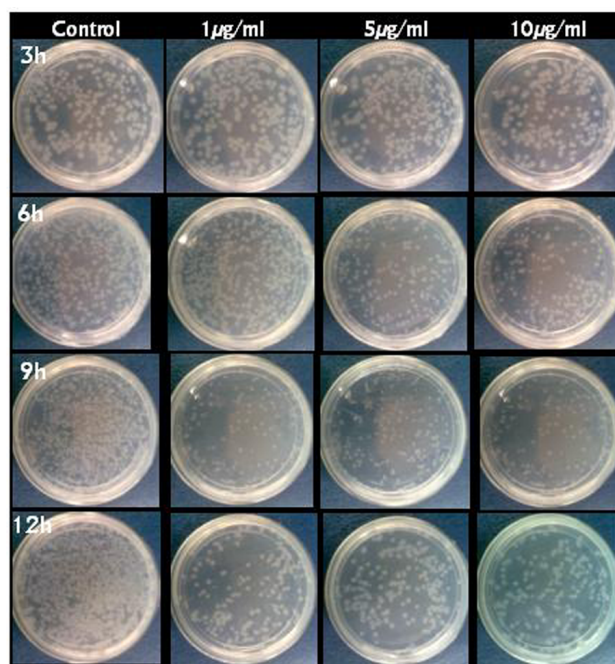
**ESI-Fig-3:** Luria-Agar plates showing antibacterial activity of different concentrations of SL-AgNPs (20 µg/mL, 40 µg/mL, 60 µg/mL, 80 µg/mL and 100 µg/mL) against *B. subtilis* at different time intervals.



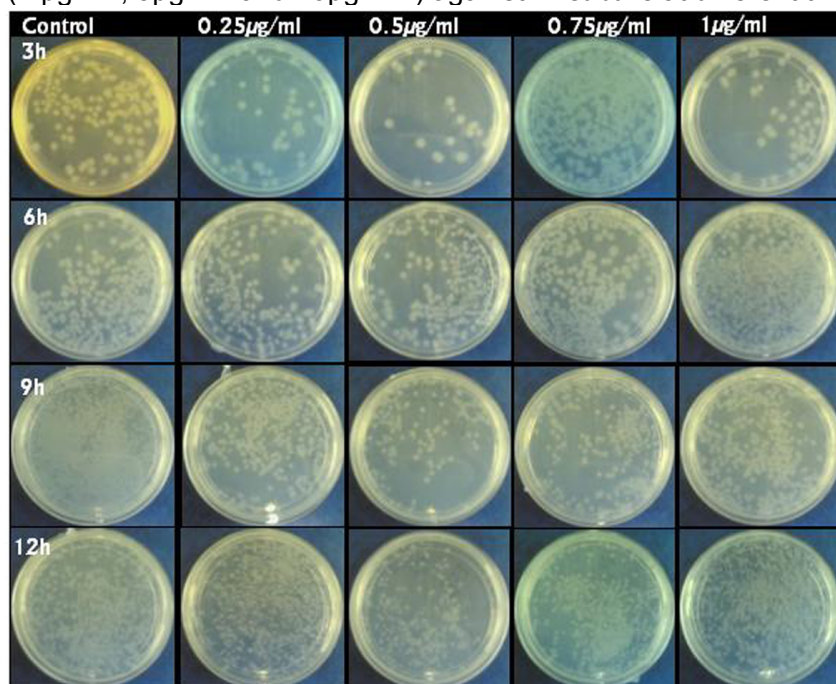
**ESI-Fig-4:** Luria-Agar plates showing antibacterial activity of different concentrations of SL-AgNPs (20 µg/mL, 40 µg/mL, 60 µg/mL and 100 µg/mL) against *P. aeruginosa* at different time intervals.



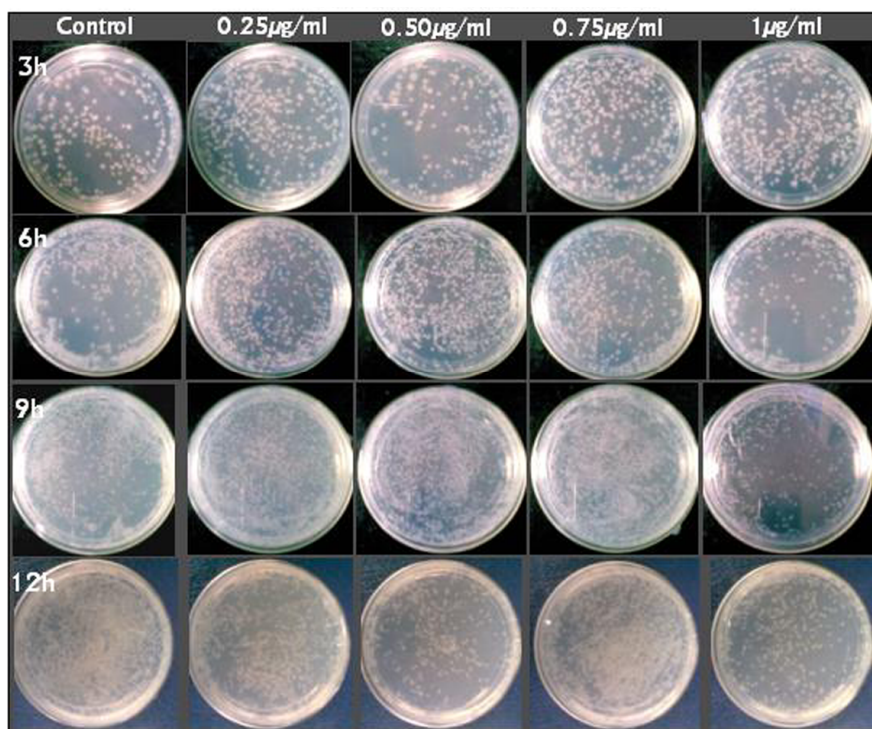
**ESI-Fig-5:** Luria-Agar plates showing antibacterial activity of different concentrations of SL-AgNPs (1 µg/mL, 5 µg/mL and 10 µg/mL) against *P. aeruginosa* at different time intervals.



**ESI-Fig-6:** Luria-Agar plates showing antibacterial activity of different concentrations of SL-AgNPs (1 µg/mL, 5µg/mL and 10µg/mL ) against *B. subtilis* at different time intervals.



**ESI-Fig-7:** Luria-Agar plates showing antibacterial activity of different concentrations of SL (0.25µg/mL, 0.50µg/mL, 0.75µg/mL and 1.0µg/mL) against *B. subtilis* at different time intervals.



**ESI-Fig-8:** Luria-Agar plates showing antibacterial activity of different concentrations of SL (0.25µg/mL, 0.50µg/mL, 0.75µg/mL and 1.0µg/mL) against *P. aeruginosa* at different time intervals.