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

Sanjay Singh, Pitamber Patel, Swarna Jaiswal, A. A. Prabhune C. V. Ramana and B. L. V. Prasad

ESI-1: Preparation and characterization of acid sophorolipid: Was prepared according to the reported procedures.\(^1\)

\([\alpha]_D^{25} = -12.5 \ (c = 0.1 \text{ g/mL}) \text{ lit.}^{1b}: \ [\alpha]_D^{25} = -12.8 \ (c = 0.0104 \text{ g/mL}). ^1\text{H NMR (400 MHz, CDCl}_3-\text{CD}_3\text{OD):} \delta 1.25 \ (d, J = 6.2 \text{ Hz, 3H}), 1.28–1.46 \ (m, 16H), 1.57–1.64 \ (m, 4H), 2.0–2.04 \ (m, 4H), 2.26 \ (t, J = 7.5 \text{ Hz, 1H}), 3.28–3.28 \ (m, 1H), 3.28–3.49 \ (m, 5H), 3.56–3.62 \ (m, 2H), 3.70–3.78 \ (m, 3H), 3.81–3.88 \ (m, 3H), 4.46 \ (d, J = 7.8 \text{ Hz, 1H}), 4.61 \ (d, J = 7.8 \text{ Hz, 1H}), 5.31–5.39 \ (m, 2H). ^1\text{C NMR (100 MHz, CDCl}_3-\text{CD}_3\text{OD):} \delta 22.1 \ (q), 26.4 \ (t), 26.7 \ (t), 28.3 \ (t), 30.3 \ (t), 30.4 \ (t), 30.5 \ (t), 30.7 \ (t), 30.8 \ (t), 30.9 \ (t), 36.7 \ (t), 37.8 \ (t), 62.8 \ (t), 63.1 \ (t), 71.4 \ (d), 71.7 \ (d), 75.6 \ (d), 77.5 \ (d), 77.6 \ (d), 77.9 \ (d), 78.1 \ (d), 78.9 \ (d), 82.1 \ (d), 102.5 \ (d), 104.7 \ (d), 130.9 \ (2d), 179.9 \ (s). \text{ MS (ESI)}: m/z = 645.47 \ (100\%, [M+Na]^+)\); 661.45 \ (52\%, [M+K]^+). \text{ Anal. Calcd for C}_{30}H_{54}O_{13}: C, 57.86; H, 8.74. \text{ Found: C, 57.60; H, 9.05.}

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 (1µg/mL, 5µg/mL and 10µg/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.