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| | |
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| Title: | Synergistic Antimicrobial Activity in Ampicillin Loaded Core-Shell ZnO@ZIF-8 Particles |
| Authors: | Mandal, S.K. (/jspui/browse?type=author&value=Mandal%2C+S.K.) |
| Keywords: | Antibiotics Controlled release Core-shell material Metal-organic frameworks ZIF-8 Zinc oxide (ZnO) |
| Issue Date: | 2019 |
| Publisher: | Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim |
| Citation: | Chemistry Select, 4(41), pp. 12002-12009. |
| Abstract: | Combination therapy with the use of nanomaterials and antibiotics is an effective approach to combat increasing antimicrobial resistance. Herein, the synthesis and antimicrobial activity of core-shell Zinc oxide - Zeolitic Imidazolate Framework-8 (ZnO@ZIF-8) particles loaded with ampicillin is reported. The efficacy of the above system has been evaluated against Gram-negative Escherichia coli (E. coli) and Gram-positive Staphylococcus aureus (S. aureus) strains. The entrapment of ampicillin within the ZIF-8 shell of the particles allowed its controlled and pH-responsive release under in vitro conditions. Ampicillin loaded ZnO@ZIF-8 particles have exhibited enhanced antimicrobial activity as reflected by the minimum inhibitory concentration (MIC) values of 12.50 and 48 µg mL ⁻¹ against E. coli and S. aureus, respectively. This was also evident by a several-fold reduction observed in the bacterial population during the time-kill assays. The values of fractional inhibitory concentration indices (FICI), assessed for different components, have revealed the ZnO@ZIF-8/ampicillin system inflicts a synergistic activity against E. coli and an additive activity against S. aureus. Cell membrane disruption is attributed to cell death. Finally, cytotoxicity study against mammalian cell lines has indicated the safety profiles of the particles. |
| Description: | Only IISERM authors are available in the record. |
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