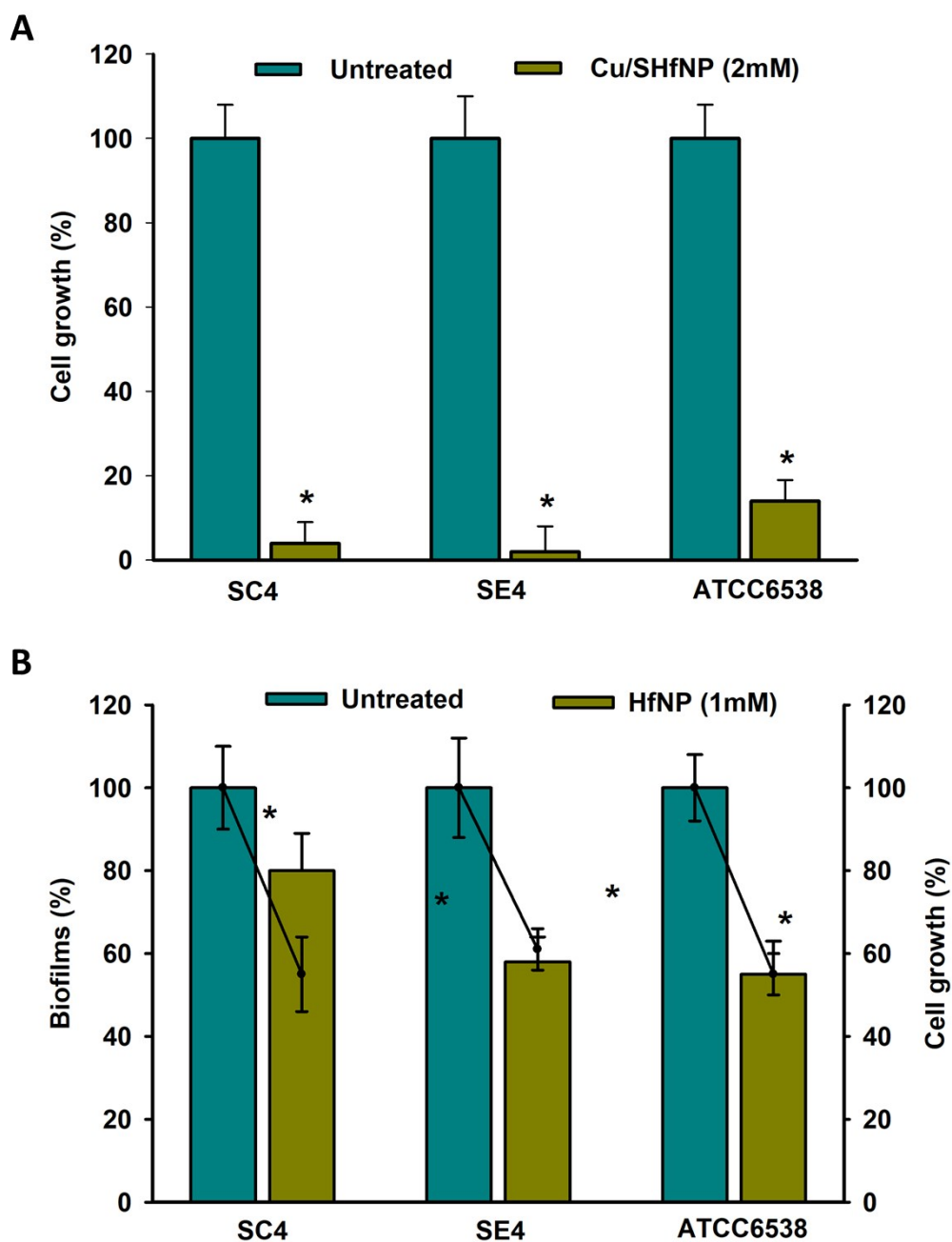
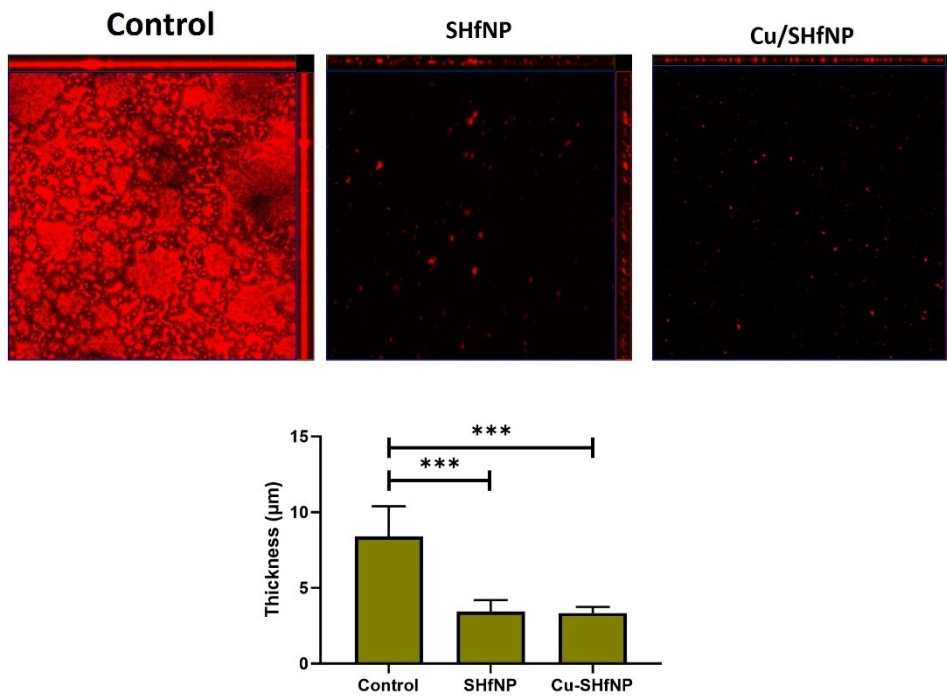


**Fig S1. Physicochemical properties of Cu/SHfNP nanoparticles (A) SEM image, (B-F) shows the EDX results of Cu/SHfNP.**



Suppl. Fig. 2. Antimicrobial activity of Cu/SHfNP (A) and biofilm activity of HfNP (B) against *E. asburiae* SC4, *E. coli* SE4 and *S. aureus* (ATCC 6538) at various concentrations



**Fig. S3. Antibiofilm activity of SHfNP and Cu/SHfNP.** The SHfNP and Cu/SHfNP reduced biofilm thickness formed by mixed species on glass surfaces.

**Table S1. Genetic identification of the bacterial strains isolated from domestic wastewater**

| <b>S. NO</b> | <b>ID</b>  | <b>Genetic name (99% identity)</b>          | <b>Accession number</b> |
|--------------|------------|---|-------------------------|
| 1            | SC1        | <i>Enterobacter asburiae JM-458</i>         | MW426390                |
| 2            | SC2        | <i>Citrobacter freundii ATCC 8090</i>       | MW426391                |
| 3            | SC3        | <i>Klebsiella quasipneumoniae</i>           | MW426392                |
| 4            | <b>SC4</b> | <b><i>Enterobacter asburiae JCM6051</i></b> | MW426393                |
| 5            | SC5        | <i>Enterobacter tabaci YIM Hb-3</i>         | MW426394                |
| 6            | SC6        | <i>Klebsiella pneumoniae</i>                | MW426395                |
| 7            | SC7        | <i>Enterobacter tabaci YIM Hb-3</i>         | MW426396                |
| 8            | SE1        | <i>Escherichia coli strain YS</i>           | MW426397                |
| 9            | SE2        | <i>Escherichia sp. strain XS</i>            | MW426398                |
| 10           | SE3        | <i>Escherichia coli strain Gut07</i>        | MW426399                |
| 11           | <b>SE4</b> | <b><i>Escherichia coli O152</i></b>         | MW426400                |
| 12           | SE5        | <i>Citrobacter freundii ATCC 8090</i>       | MW426401                |
| 13           | SE6        | <i>Escherichia coli O152</i>                | MW426402                |
| 14           | SE7        | <i>Enterobacter sp</i>                      | MW426403                |
| 15           | SE8        | <i>Escherichia coli NBRC 102203</i>         | MW426404                |

| IDs | Ampicillin | Carbapenem | Cefotaxime | Ciprofloxacin | Colistin | Gentamicin | Kanamycin | Sulfamethoxazole | Streptomycin | Tetracycline | Vancomycin |
|-----|------------|------------|------------|---------------|----------|------------|-----------|------------------|--------------|--------------|------------|
| SC1 | R          | R          | S          | S             | S        | R          | R         | R                | R            | S            | R          |
| SC2 | R          | R          | S          | S             | S        | R          | R         | R                | R            | R            | R          |
| SC3 | R          | R          | S          | S             | S        | R          | R         | R                | R            | S            | R          |
| SC4 | R          | R          | S          | S             | R        | R          | R         | R                | R            | S            | R          |
| SC5 | R          | R          | R          | S             | R        | R          | R         | R                | R            | S            | R          |
| SC6 | R          | R          | R          | S             | S        | R          | R         | R                | R            | S            | R          |
| SC7 | R          | R          | S          | S             | S        | R          | R         | R                | R            | S            | R          |
| SE1 | R          | R          | R          | S             | S        | R          | R         | R                | R            | S            | R          |
| SE2 | R          | R          | R          | S             | S        | S          | R         | R                | S            | R            | S          |
| SE3 | R          | R          | R          | S             | S        | S          | R         | R                | S            | S            | R          |
| SE4 | R          | R          | R          | S             | S        | S          | R         | R                | R            | S            | R          |
| SE5 | R          | R          | R          | S             | S        | S          | R         | R                | R            | R            | R          |
| SE6 | R          | R          | R          | S             | S        | S          | R         | R                | S            | S            | R          |
| SE7 | R          | R          | R          | S             | S        | S          | R         | R                | R            | S            | R          |
| SE8 | R          | R          | R          | S             | S        | S          | R         | R                | R            | S            | R          |

**Table S2. Antibiotic sensitivity test for wastewater isolates from secondary effluents**

R, resistance denotes bacterial growth even when higher concentration tested (200 µg/ml). S, susceptible denotes the growth inhibition at 200 µg/ml.