

Enhanced Antimicrobial Photodynamic Therapy against *Escherichia coli* Using MXene-Based Silver–Curcumin 2D Nanocomposite Photosensitizers

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Supplementary data:

Table S1. Inoculums of *E. coli* incubated with MXene, silver, curcumin and MXene -silver-curcumin NCs for 24 hours, and agar plates were used for the calculations of Zone of inhibition.

| Sr. | Materials | Inhibition Zone (mm) for <i>E. coli</i> MXene-silver-curcumin Nano particles | | | Average |
|-----|-----------|--|-------|-------|-------------|
| | | 1 | 2 | 3 | |
| 1. | MXene | 0 | 0 | 0 | 0 |
| 2. | Silver | 14.69 | 13.22 | 14.18 | 14.03±0.74 |
| 3. | Curcumin | 0 | 0 | 0 | 0 |
| 4. | Composite | 14.85 | 12.93 | 14.01 | 13.93± 0.90 |

Table S2. Inoculums of *E. coli* incubated with MXene -silver-curcumin NCs different concentrations for 24 hours, and agar plates were used for the calculations of Zone of inhibition.

| Sr. | Concentration (µl/ml) | Inhibition Zone (mm) for <i>E. coli</i> MXene-silver-curcumin NCs | | | Average |
|-----|-----------------------|---|-------|-------|-------------|
| | | 1 | 2 | 3 | |
| 1. | 500 | 15.01 | 15.67 | 15.75 | 15.47± 0.40 |
| 2. | 250 | 14.74 | 14.41 | 14.01 | 14.38± 0.36 |
| 3. | 125 | 13.39 | 13.21 | 12.98 | 13.19± 0.20 |
| 4. | 62 | 12.12 | 11.01 | 11.87 | 11.61± 0.58 |
| 5. | 31 | 9.75 | 8.01 | 9.31 | 9.01± 0.90 |

Table S3 CFU/mL values composite against *E. coli*.

| Sr. | Concentration ($\mu\text{g/ml}$) | Time (Min) | (CFU/ml) against <i>E. coli</i> | | | Average |
|-----|---------------------------------------|---------------|---------------------------------|-------|--------|---------------------------------------|
| | | | 1 | 2 | 3 | |
| 1 | 500 | 10 | 1.8E6 | 1.7E6 | 1.6E6 | $1.7 \times 10^6 \pm 1.0 \times 10^5$ |
| | | 20 | 10.0E4 | 9.0E4 | 11.0E4 | $1.0 \times 10^5 \pm 1.0 \times 10^4$ |
| | | 30 | 2.0E4 | 1.0E4 | 2.0E4 | $1.6 \times 10^4 \pm 5.7 \times 10^3$ |
| | | 40 | 1.0E4 | 2.0E4 | 1.0E4 | $1.3 \times 10^4 \pm 5.7 \times 10^3$ |
| | | 50 | 0 | 0 | 0 | 0 \pm 0 |
| | | 60 | 0 | 0 | 0 | 0 \pm 0 |
| 2 | 250 | 10 | 4.9E6 | 4.6E6 | 4.9E6 | $4.8 \times 10^6 \pm 1.7 \times 10^5$ |
| | | 20 | 1.0E6 | 1.1E6 | 1.2E6 | $1.1 \times 10^6 \pm 1.0 \times 10^5$ |
| | | 30 | 2.6E5 | 2.8E5 | 2.4E5 | $2.6 \times 10^5 \pm 2.0 \times 10^4$ |
| | | 40 | 8.0E4 | 9.0E4 | 7.0E4 | $8.0 \times 10^4 \pm 1.0 \times 10^4$ |
| | | 50 | 0 | 0 | 0 | 0 \pm 0 |
| | | 60 | 0 | 0 | 0 | 0 \pm 0 |
| 3 | 125 | 10 | 4.4E6 | 4.5E6 | 4.6E6 | $4.5 \times 10^6 \pm 1.0 \times 10^5$ |
| | | 20 | 2.8E6 | 2.9E6 | 2.7E6 | $2.8 \times 10^6 \pm 1.0 \times 10^5$ |
| | | 30 | 1.0E6 | 1.4E6 | 1.2E6 | $1.2 \times 10^6 \pm 2.0 \times 10^5$ |
| | | 40 | 3.3E5 | 3.4E5 | 3.7E5 | $3.4 \times 10^5 \pm 2.0 \times 10^4$ |
| | | 50 | 1.2E5 | 1.5E5 | 1.2E5 | $1.3 \times 10^5 \pm 1.7 \times 10^4$ |

| | | | | | | |
|---|----|----|-------|-------|-------|--|
| | | 60 | 0 | 0 | 0 | 0±0 |
| 4 | 62 | 10 | 6.8E6 | 6.7E6 | 6.6E6 | 6.7×10 ⁶ ±1.0×10 ⁵ |
| | | 20 | 5.1E6 | 5.2E6 | 5.2E6 | 5.1×10 ⁶ ±5.7×10 ⁵ |
| | | 30 | 7.2E5 | 7.4E5 | 7.3E5 | 7.3×10 ⁵ ±1.0×10 ⁴ |
| | | 40 | 1.5E5 | 1.8E5 | 2.1E5 | 1.8×10 ⁵ ±1.0×10 ⁵ |
| | | 50 | 5.0E4 | 6.0E4 | 7.0E4 | 6.0×10 ⁴ ±1.0×10 ⁴ |
| | | 60 | 1.0E4 | 3.0E4 | 5.0E4 | 3.0×10 ⁴ ±2.0×10 ⁴ |
| 5 | 31 | 10 | 6.9E6 | 6.7E6 | 7.1E6 | 6.9×10 ⁶ ±1.0×10 ⁵ |
| | | 20 | 2.6E6 | 2.7E6 | 2.5E6 | 2.6×10 ⁶ ±1.0×10 ⁵ |
| | | 30 | 3.0E5 | 3.1E5 | 2.9E5 | 3.0×10 ⁵ ±1.0×10 ⁴ |
| | | 40 | 2.5E5 | 2.6E5 | 2.4E5 | 2.5×10 ⁵ ±1.0×10 ⁴ |
| | | 50 | 1.4E5 | 1.3E5 | 1.5E5 | 1.4×10 ⁵ ±1.0×10 ⁴ |
| | | 60 | 5.0E4 | 6.0E4 | 4.0E4 | 5.0×10 ⁴ ±1.0×10 ⁴ |

Table S4 Cell lines:

| Concentration (µg/mL) | Absorbance (550 nm) | % Viability | Error bar |
|-----------------------|---------------------|------------------------|-----------|
| 0 (Control) | 1.245 | 100% | ±1.0 |
| 31 | 1.146 | (1.14/1.245)×100 = 92% | ±1.2 |
| 62 | 1.09 | 87% | ±0.9 |
| 125 | 0.987 | 79% | ±1.1 |
| 250 | 0.894 | 72% | ±0.8 |

| Concentration ($\mu\text{g/mL}$) | Absorbance (550 nm) | % Viability | Error bar |
|--|----------------------------|--------------------|------------------|
| 500 | 0.757 | 61% | ± 1.1 |