**Supplementary Material**

**Titanium based complexes with melanin precursors   
as a tool for directing melanogenic pathways**

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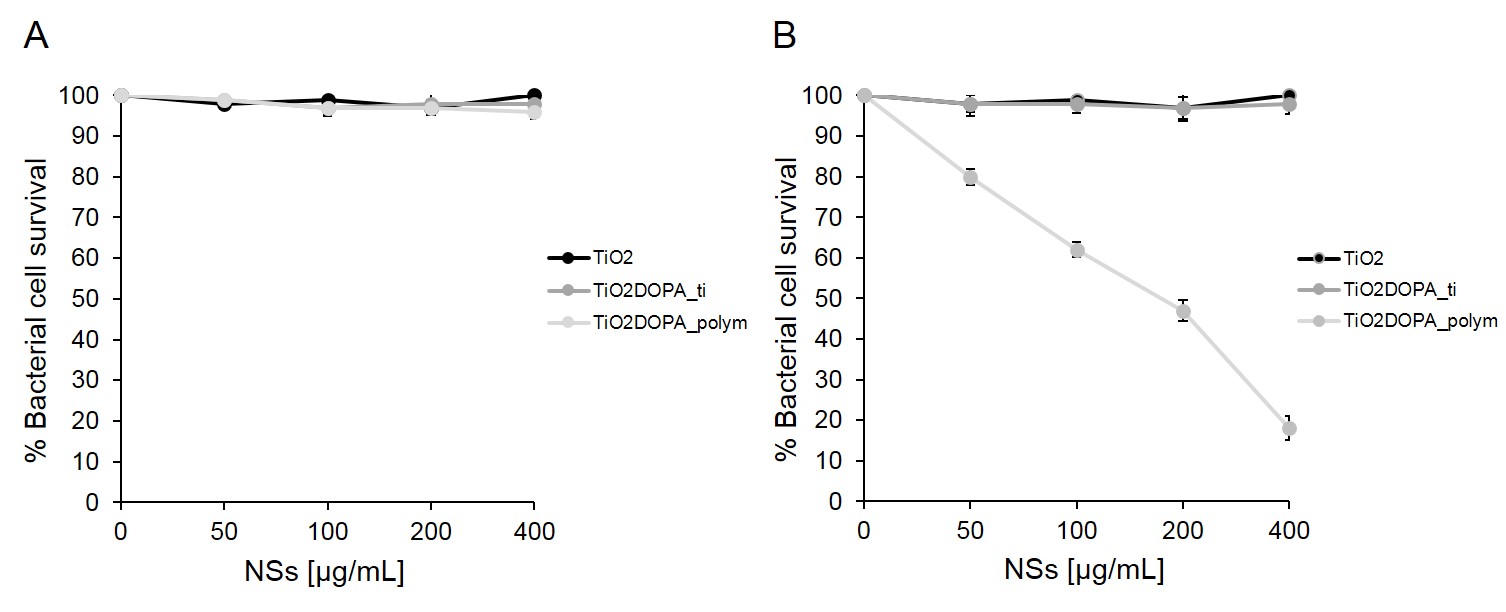
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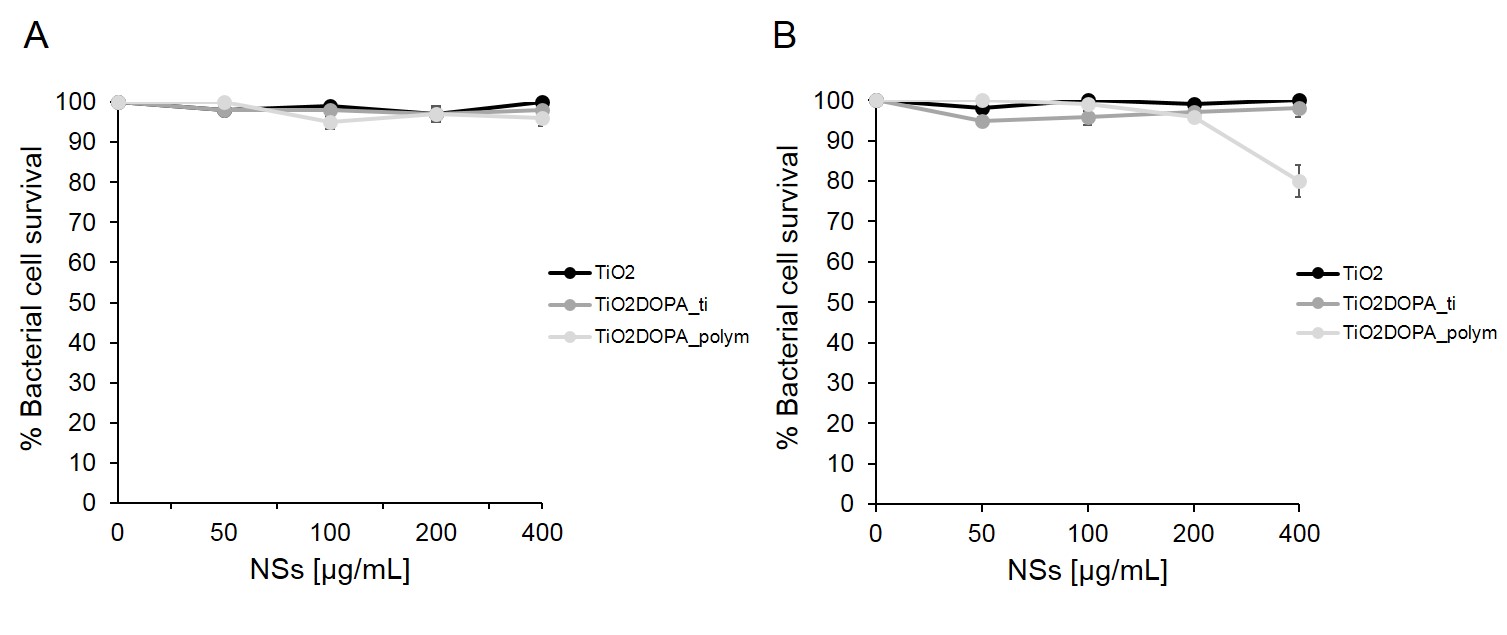
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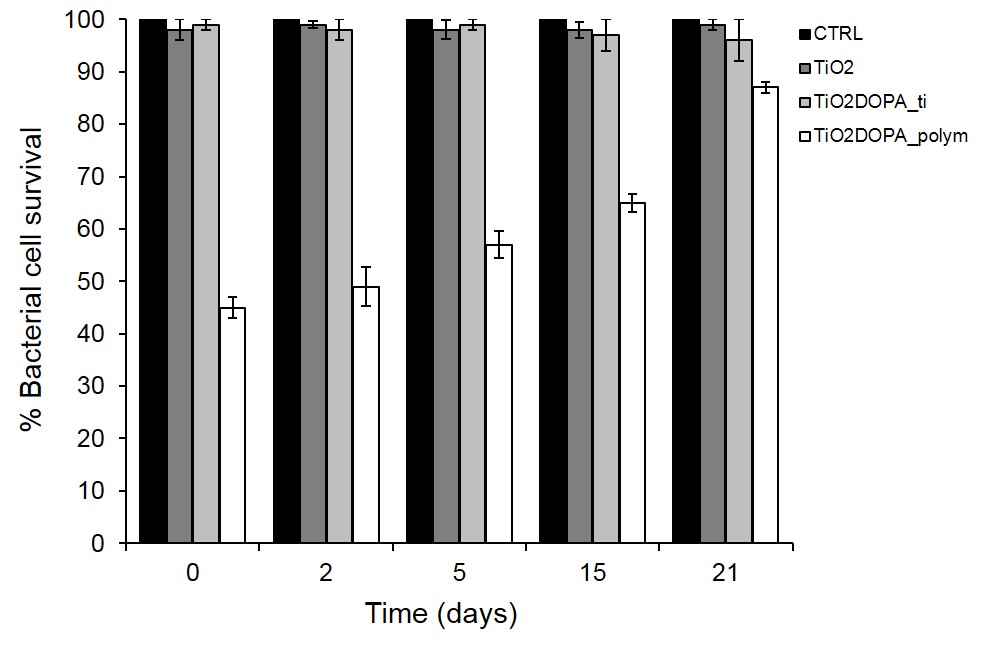
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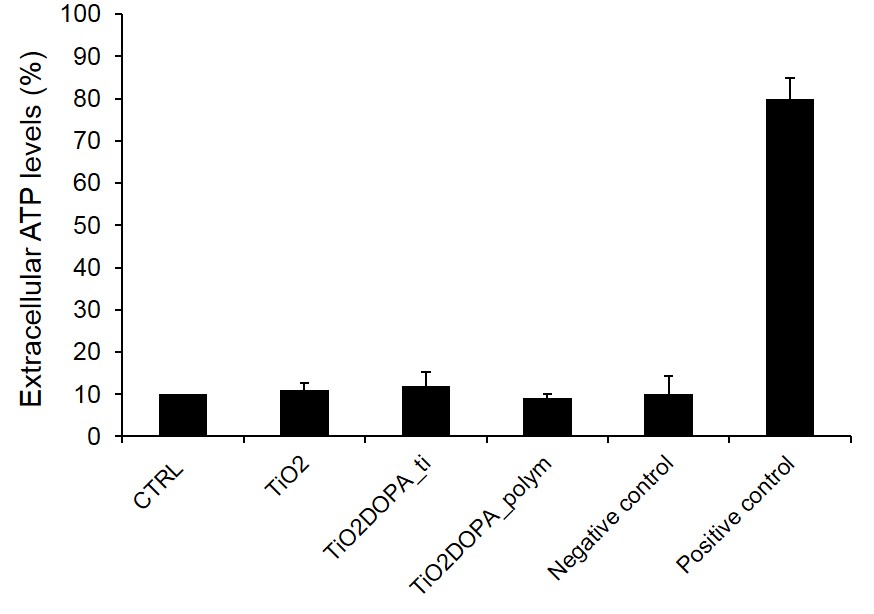
**Fig. S1**: Antimicrobial activity of TiO2 (black circles), TiO2DOPA\_ti (dark gray circles) and TiO2DOPA\_polym (light gray circles) at different concentrations (0 – 400 μg/mL) evaluated by colony count assay, against *Escherichia coli DH5α* strain after 10 minutes of incubation (panel A) and after 4h of incubation (panel B). The % of bacterial survival is represented on the y axis. The assays were performed for three independent experiments.



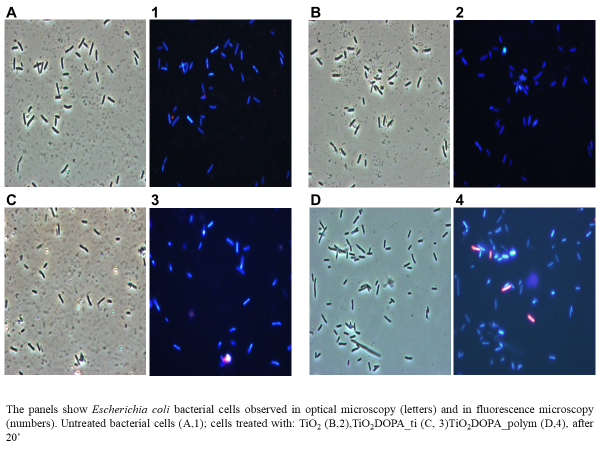
**Fig. S2**: Antimicrobial activity of TiO2 (black circles), TiO2DOPA\_ti (dark gray circles) and TiO2DOPA\_polym (light gray circles) at different concentrations (0 – 400 μg/mL) evaluated by colony count assay, against *Staphylococcus aureus ATCC 6538* strain after 10 minutes of incubation (panel A) and after 4h of incubation (panel B). The % of bacterial survival is represented on the y axis. The assays were performed for three independent experiments.

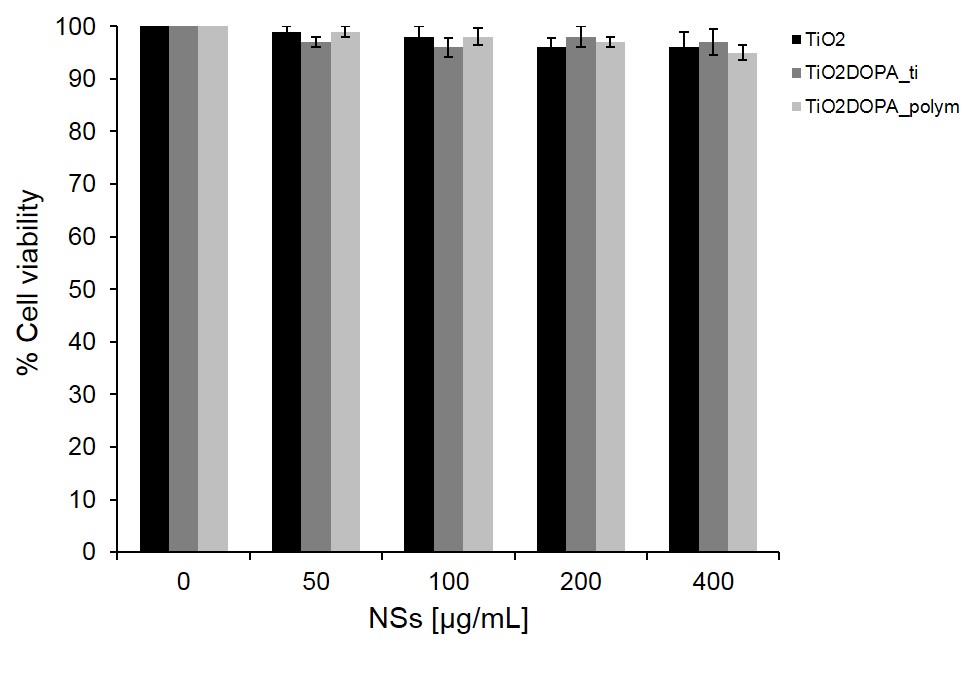
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**Fig. S3:** Antimicrobial activity of TiO2, TiO2DOPA\_ti and TiO2DOPA\_polym nanostructures stored for different times (0-21 days), evaluated by colony count assay, against *Escherichia coli DH5α* strain. The % of bacterial survival is represented on the y axis. *E. coli* cells with any treatment represent the negative control (black bars); survival of bacteria treated with 200 μg/mL TiO2 is reported with dark gray bars, TiO2DOPA\_ti with light gray bars and TiO2DOPA\_polym with white bars. The assays were performed for three independent experiments. P value was ˂ 0.05.



**Fig. S4**: Adenosine triphosphate (ATP) percentage in culture of *Escherichia coli DH5α* treated with NSs (200μg/ml) for 10 minutes. The positive control is represented by the polimixin B (10 µg/mL) known to form pores in the membrane and to determine the release of ATP. The negative control is represented by the ampicillin (50 µg/mL). Vertical bars indicate ±SD. Experiments were carried out in triplicate.

**Fig. S5:** The panels show *Escherichia coli DH5α* bacterial cells observed in optical microscopy (letters) and in fluorescence microscopy (numbers). Untreated bacterial cells (A, 1); cells treated with: TiO2 (B, 2), TiO2DOPA\_ti (C, 3), TiO2DOPA\_polym (D, 4).



**Fig. S6:** Cytotoxic effects of TiO2, TiO2DOPA\_ti and TiO2DOPA\_polym [0-400µg/mL] on HaCat (Human keratinocytes) human cells by performing the 3-(4,5-dimethylthiazol-2-yl)-2,5 diphenyltetrazolium bromide (MTT) reduction inhibition assay. The mean values and SD from three independent experiments run in triplicate are shown.



**Fig. S7:** XRD spectra of bare TiO2 and TiO2-DOPA\_ti nanostructures.



**Fig. S8:** EPR spectra of TiO2 (**a**), TiO2DOPA\_ti (continuous lines) and TiO2DOPA\_polym (dotted lines) nanohybrids prepared at different TTiP/DOPA weight ratios by using 1 (**b**), 2 (**c**), 5 (**d**), 10 (**e**) and 20 (**f**) mg of DOPA monomer.

|  |  |  |
| --- | --- | --- |
| **SAMPLES** | **B /G** | |
|  | *ti* | *polym* |
| **DOPA-melanin** | 4.8 ± 0.2 | |
| **TiO2-DOPA1** | 7.0 ± 0.2 | 7.0 ± 0.2 |
| **TiO2-DOPA2** | 7.1 ± 0.2 | 7.2 ± 0.2 |
| **TiO2-DOPA5** | 7.0 ± 0.2 | 6.9 ± 0.2 |
| **TiO2-DOPA10** | 7.0 ± 0.2 | 7.2 ± 0.2 |
| **TiO2-DOPA20** | 6.9 ± 0.2 | 6.9 ± 0.2 |

**Table S1:** EPR spectral parameters for DOPA-based/TiO2 nanohybrids.



**Fig. S9**: Plot of normalised amplitude vs. power intensities of free radicals of TiO2DOPA\_ti at (panel **A**) and TiO2DOPA\_polym (panel **B**) hybrids at different titanium precursor/DOPA ratios.



**Fig. S10:** UV-vis spectra of acetic acid/DOPA aqueous mixtures in the absence of TTiP (**a**) and after neutralization with NaOH at pH=4 (**b**), pH=5.5 (**c**) and pH=7 (**d**).