

Supplementary Information

for

Photocatalytic and Antibacterial Performance of Nitrogen-doped TiO₂: Surface-Structure Dependence and Silver-Deposition Effect

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Text S1. Sample preparation for antibacterial study

For measurements of the antibacterial effect, the catalyst samples were immobilized in an acrylate based polymer on a plastic surface. The catalyst concentration on the plastic surface was 485 mg/m². Discs of 1 cm diameter were cut from this plastic sheet and fixed to the bottom of small, open sample containers (glass tubes) with screw caps. The bacterial suspensions were layered on the samples. The antibacterial effects of the catalysts were measured by using *Vibrio fischeri* luminescent bacteria. After reconstitution, the guaranteed life-span of bacteria was 4 hours. The suspension of bacteria was incubated for 80 minutes at 15°C. At the end of the incubation period, 0.5 cm³ sample was measured into the sample holders, which were kept in the dark during the experiment, and the emission intensities of the samples were recorded at defined times. The reference sample was stored in a bottle, which did not contain any plastic disc. The control sample contained a disc from a commercially available plastic sheet with antibacterial surface. During the evaluation, the results obtained from 3 parallel measurements were averaged and then the relative decomposition percentage was calculated. Afterwards, the relative decomposition (%) of the actual sample was compared to the control one.

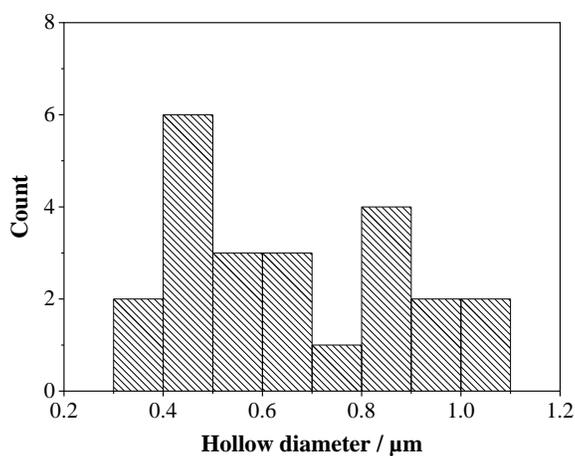


Figure S1. Hollow-diameter distribution of Ag/NT-A.

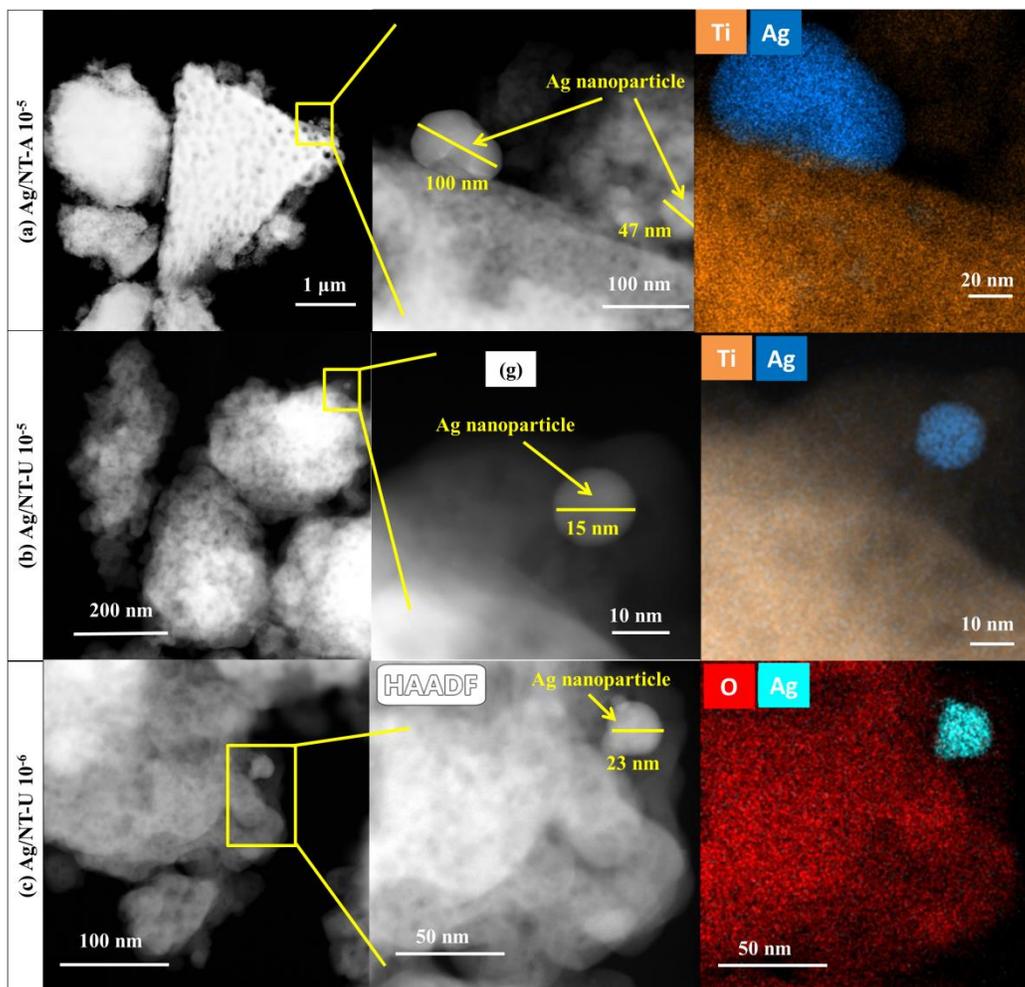


Figure S2. HAADF-TEM images and element maps of (a) Ag/NT-A 10^{-5} , (b) Ag/NT-U 10^{-5} and (c) Ag/NT-U 10^{-6} (10^{-5} and 10^{-6} are the Ag concentrations in mol g^{-1}).

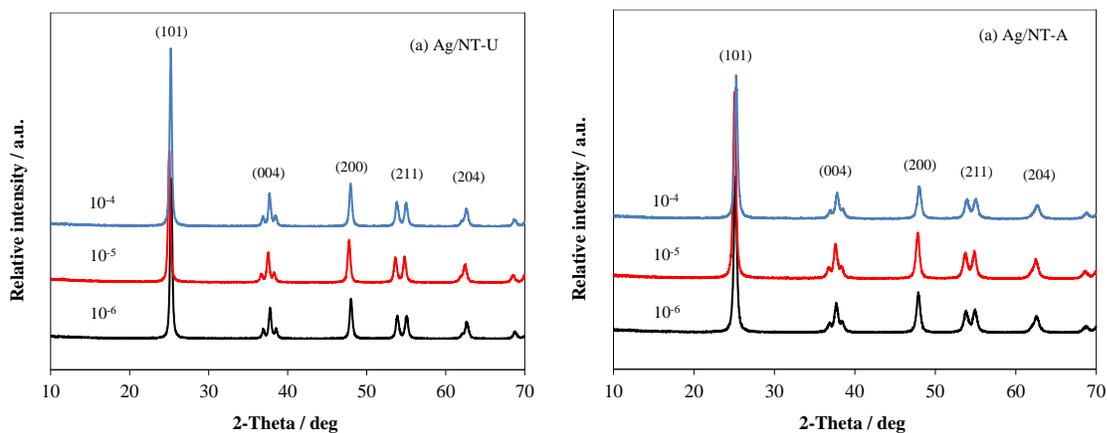


Figure S3. XRD patterns of (a) Ag/NT-U and (b) Ag/NT-A with different Ag-loadings.

Table S1. Crystallite size and band-gap energy of Ag/NT-U and Ag/NT-A with different Ag-loadings.

| Catalyst | Ag content / mol g ⁻¹ | Crystallite size / nm | Band-gap energy / eV |
|----------|----------------------------------|-----------------------|----------------------|
| Ag/NT-U | 10 ⁻⁶ | 25.2 | 3.07 |
| | 10 ⁻⁵ | 24.8 | 3.01 |
| | 10 ⁻⁴ | 25.4 | 2.96 |
| Ag/NT-A | 10 ⁻⁶ | 17.3 | 3.06 |
| | 10 ⁻⁵ | 18.8 | 3.01 |
| | 10 ⁻⁴ | 17.4 | 2.98 |

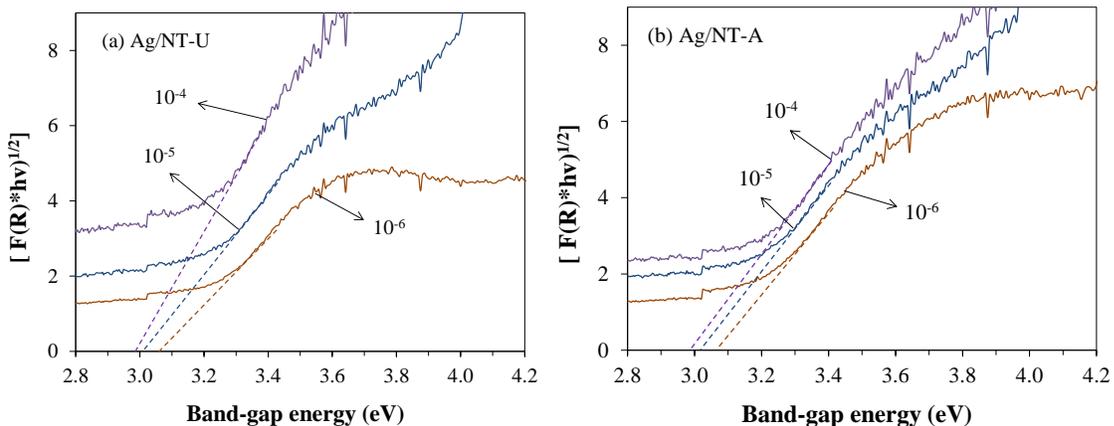


Figure S4. Band-gap energy of (a) Ag/NT-U and (b) Ag/NT-A with different Ag-loadings.

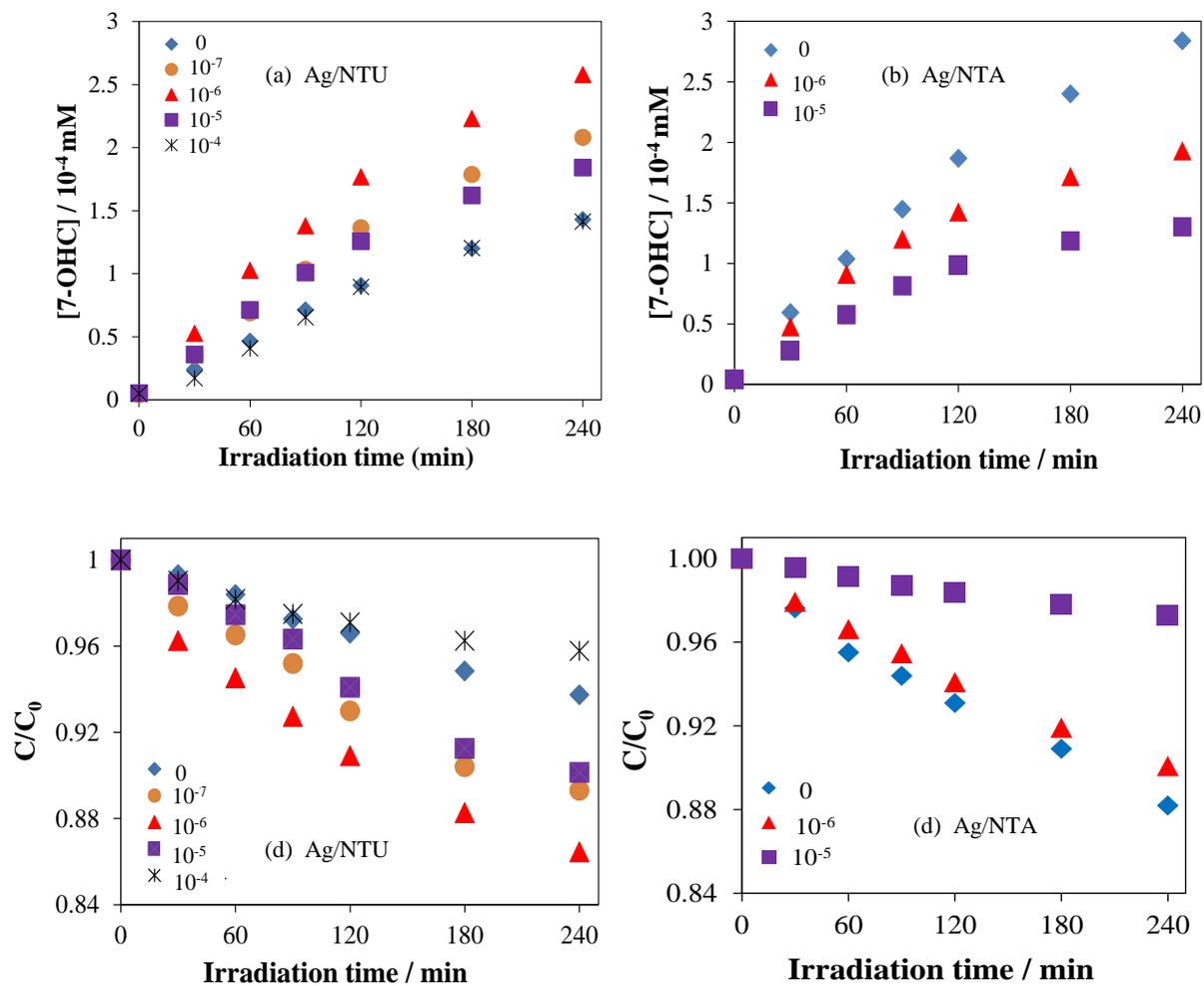


Figure S5. (a-b) 7-OHC formation and (c-d) coumarin degradation over Ag/NTU and Ag/NT-A with different Ag-loadings.

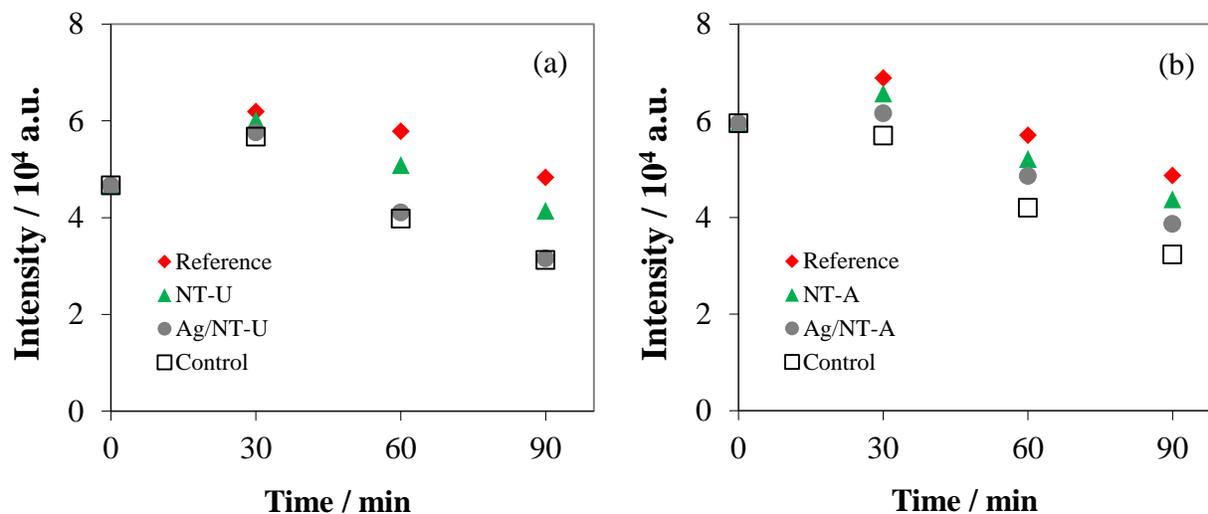


Figure S6. Luminescence intensity of bacterial suspension in the presence of (a) Ag/NT-U and (b) Ag/NT-A catalysts (with 10^{-6} mol g⁻¹ Ag concentration) compared to the reference and control samples.

Table S2. Relative decomposition of bacteria in presence of NT-U and Ag/NT-U (with 10^{-6} mol g⁻¹ Ag concentration) catalysts as well as the control sample.

| Time / min | NT-U | Ag/NT-U | Control |
|------------|--------|---------|---------|
| 0 | 0.00% | 0.00% | 0.00% |
| 30 | 2.89% | 7.01% | 8.43% |
| 60 | 12.06% | 29.07% | 31.25% |
| 90 | 14.27% | 34.64% | 35.35% |

Table S3. Relative decomposition of bacteria in presence of NT-A and Ag/NT-A (with 10^{-6} mol g⁻¹ Ag concentration) catalysts as well as the control sample.

| Time / min | NT-A | Ag/NT-A | Control |
|------------|--------|---------|---------|
| 0 | 0.00% | 0.00% | 0.00% |
| 30 | 4.62% | 10.61% | 17.32% |
| 60 | 8.63% | 14.83% | 26.32% |
| 90 | 10.09% | 20.58% | 33.66% |