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Electrochemically Obtained TiO_2/Cu_xO_y Nanotube Arrays Presenting a Photocatalytic Response in Processes of Pollutants Degradation and Bacteria Inactivation in Aqueous Phase

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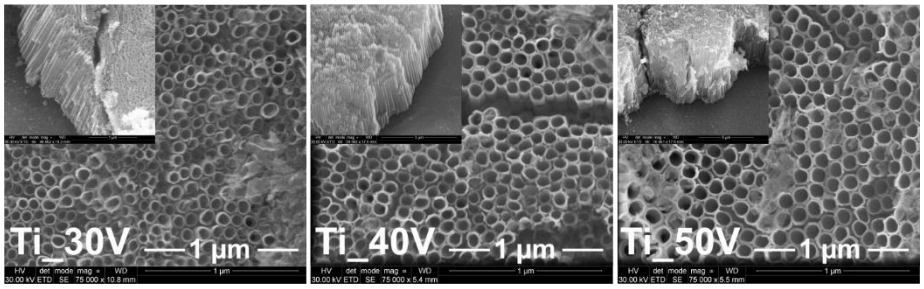

Figure S1. Top-view and cross-sectional SEM images of pristine TiO_2 NTs.

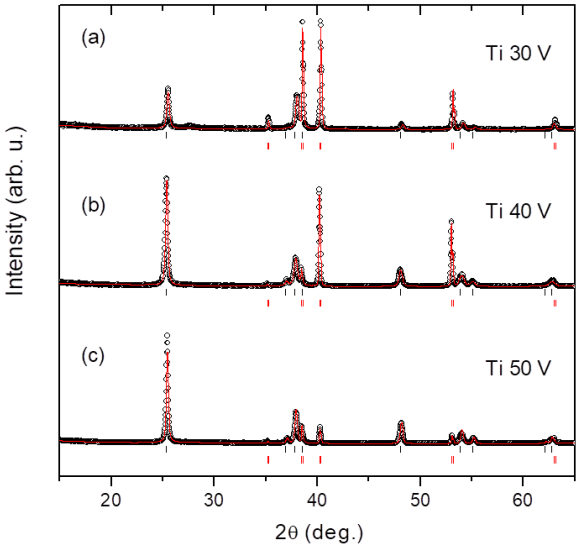

Figure S2. X-ray diffraction patterns for pristine TiO_2 NTs.

Table S1. Refined lattice parameters for TiO_2 – anatase, Ti – metal and $CuTiO_2$ – alloy. The crystallite size was calculated for the anatase only.

Sample label	Anatase			Ti		$CuTi_2$	
	a (Å)	c (Å)	cryst. size (Å)	a (Å)	c (Å)	a (Å)	c (Å)
Ti_30V	3.7802(3)	9.4992(7)	400	2.9502(1)	4.6830(1)	---	---
Ti_40V	3.7989(2)	9.5271(6)	350	2.9591(1)	4.6949(2)	---	---
Ti_50V	3.7899(1)	9.5212(4)	500	2.9557(2)	4.6903(2)	---	---
$Ti_{95}Cu_5$_30V	3.783(1)	9.505(2)	250	2.9491(6)	4.681(1)	2.9413(9)	10.764(6)
$Ti_{90}Cu_{10}$_30V	3.7896(5)	9.515(1)	360	2.9541(2)	4.6908(4)	2.9451(3)	10.780(1)
$Ti_{85}Cu_{15}$_30V	3.7914(6)	9.518(1)	390	2.9542(2)	4.6896(5)	2.9450(4)	10.777(1)
$Ti_{90}Cu_{10}$_40V	3.7917(3)	9.519(1)	460	2.9548(2)	4.6898(3)	2.9464(3)	10.786(1)
$Ti_{90}Cu_{10}$_50V	3.7857(5)	9.512(1)	460	2.9535(3)	4.6881(5)	2.9445(3)	10.776(1)

Table S2. Elemental composition (in at. %) in the surface layer of TiO_2 and Cu-modified TiO_2 NTs, evaluated by XPS analysis.

Sample label	∑ Ti (at.%)	∑ Cu (at.%)	∑ O (at.%)	∑ C (at.%)	∑ N (at.%)	∑ F (at.%)
$Ti_{95}Cu_5$_30V	21.79	0.13	58.41	18.01	1.35	0.31
$Ti_{90}Cu_{10}$_30V	25.32	0.11	65.19	7.51	0.29	1.58
$Ti_{85}Cu_{15}$_30V	23.99	0.14	63.70	11.47	0.39	0.31
$Ti_{90}Cu_{10}$_40V	25.41	0.11	65.76	7.34	0.45	0.93
$Ti_{90}Cu_{10}$_50V	25.06	0.08	66.82	6.58	0.42	1.04
Ti_30V	16.20	0	39.55	17.89	<0.05	26.35
Ti_40V	24.79	0	60.83	12.23	1.47	0.68
Ti_50V	26.29	0	62.18	8.20	<0.05	3.33

Table S3. Efficiency of bacteria inactivation after 20, 40 and 60 min of various processes.

Incubation time (min)	Efficiency of bacteria inactivation, 1-C/C$_0$ (%)		
	Light source: switched on **Bacteria:** present **Photocatalytic layer:** present	**Bacteria:** present **Photocatalytic layer:** present	**Light source:** switched on **Bacteria:** present
	***Escherichia Coli* – DH11S OD = 0.09 – gram negative**		
	STARTING CFU/ml: 3.3·10^2		
0	0%	0%	0%
20	3%	6%	-
40	15%	0%	-
60	97%	12%	3%
	***Bacillus Subtilis* – OD = 0.09 – gram positive**		
	STARTING CFU/ml: 2.5·10^2		
0	0%	0%	0%
20	20%	16%	-
40	-	16%	-
60	-	-	16%
	***Clostridium sp.* – OD = 0.1 – gram positive**		
	STARTING CFU/ml: 3.8·10^2		
0	0%	0%	0%
20	5%	3%	-
40	68%	5%	-
60	98%	0%	5%

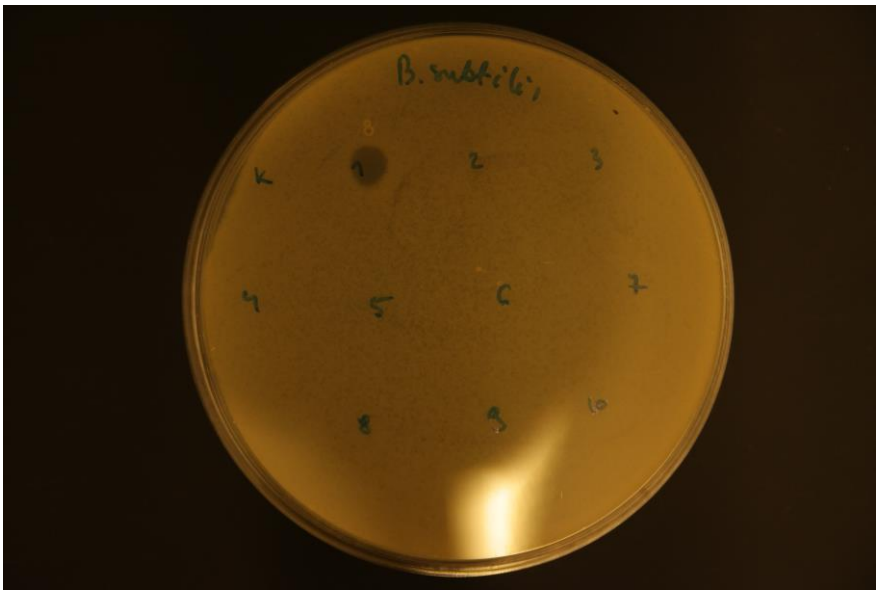

Figure S3. Image of influence of Cu^{2+} ions on the growth *of B. subtilis.*

Table S4. The influence of Cu^{2+} ions on the growth of *E. coli* and *B.subtilis*. (a) OD measurements at 600 nm of *E. coli* and *B.subtilis* cultures with the addition of Cu^{2+} ions from 1 – 1 × 10^{-9} mM (serial dilution), (b) OD measurements at 600 nm of *B.subtilis* culture with addition of Cu^{2+} ions from 10 – 1.9 × 10^{-2} from 1 – 10^{-9} mM. T_o, T_1, T_2 – the subsequent measurement points; Kp – positive control, culture of strain without Cu2+ ions; Kn – negative control, the medium.

(a)

	T_o	***B.st***	**T_o**	***E.coli***
Kp	0,131	0,131	0,105	0,105
1	0,131	0,059	0,105	0,047
2	0,131	0,110	0,105	0,086
3	0,131	0,122	0,105	0,097
4	0,131	0,123	0,105	0,101
5	0,131	0,132	0,105	0,104
6	0,131	0,128	0,105	0,106
7	0,131	0,129	0,105	0,11
8	0,131	0,130	0,105	0,107
9	0,131	0,128	0,105	0,108
10	0,131	0,134	0,105	0,11
Kn	0,000	0,000	0,105	0,000

(b)

	T_o	**T_1**	**T_2**	**T_3**
Kp	0,124	0,124	0,55	1,51
Kn	0,000	0,000	0,000	0,000
10 mM	0,124	0,013	0,471	1,31
5 mM	0,124	0,034	0,521	1,28
2,5 mM	0,124	0,06	0,524	1,477
1,25 mM	0,124	0,075	0,526	1,49
0,625 mM	0,124	0,088	0,531	1,506
0,3125 mM	0,124	0,101	0,531	1,503
0,15625 mM	0,124	0,107	0,525	1,524
0,078 mM	0,124	0,115	0,561	1,551
0,039 mM	0,124	0,112	0,572	1,513
0,019 mM	0,124	0,121	0,562	1,512