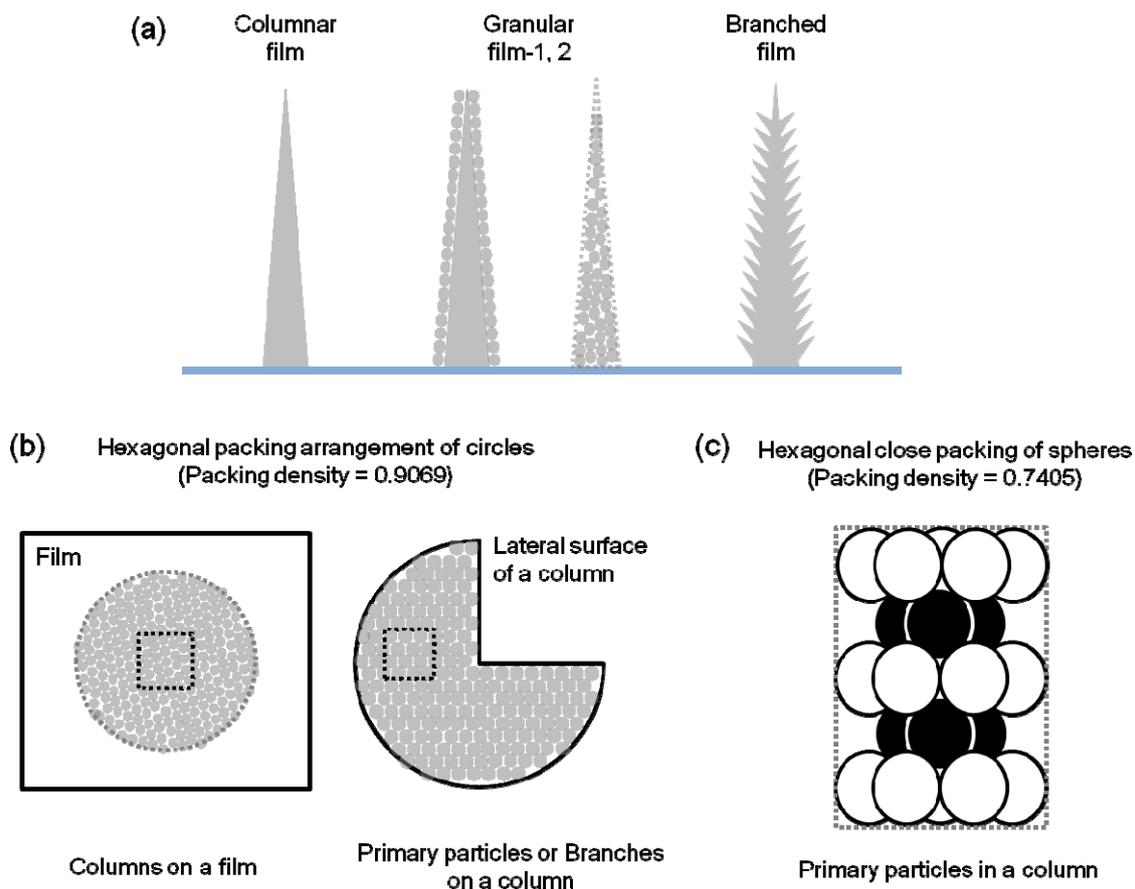
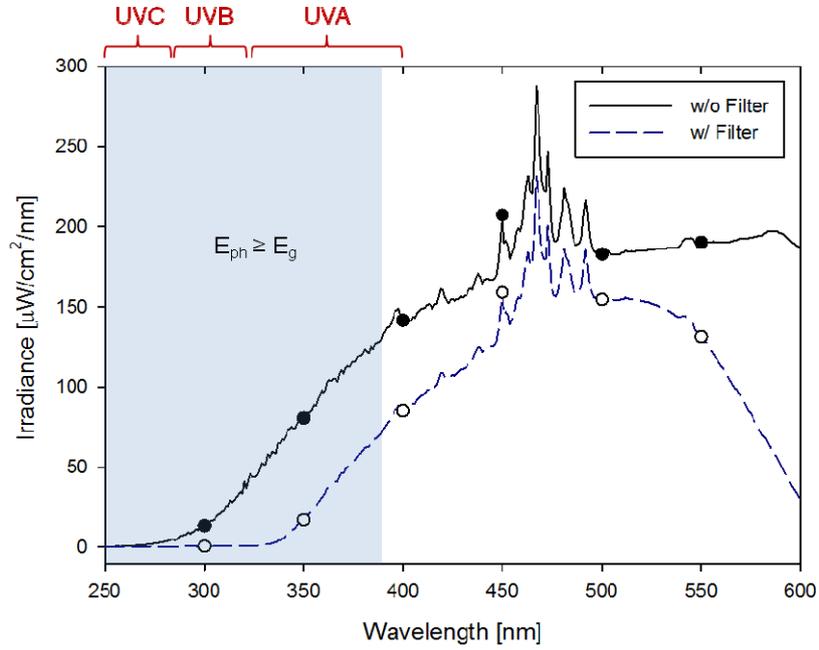


## Supplementary Information

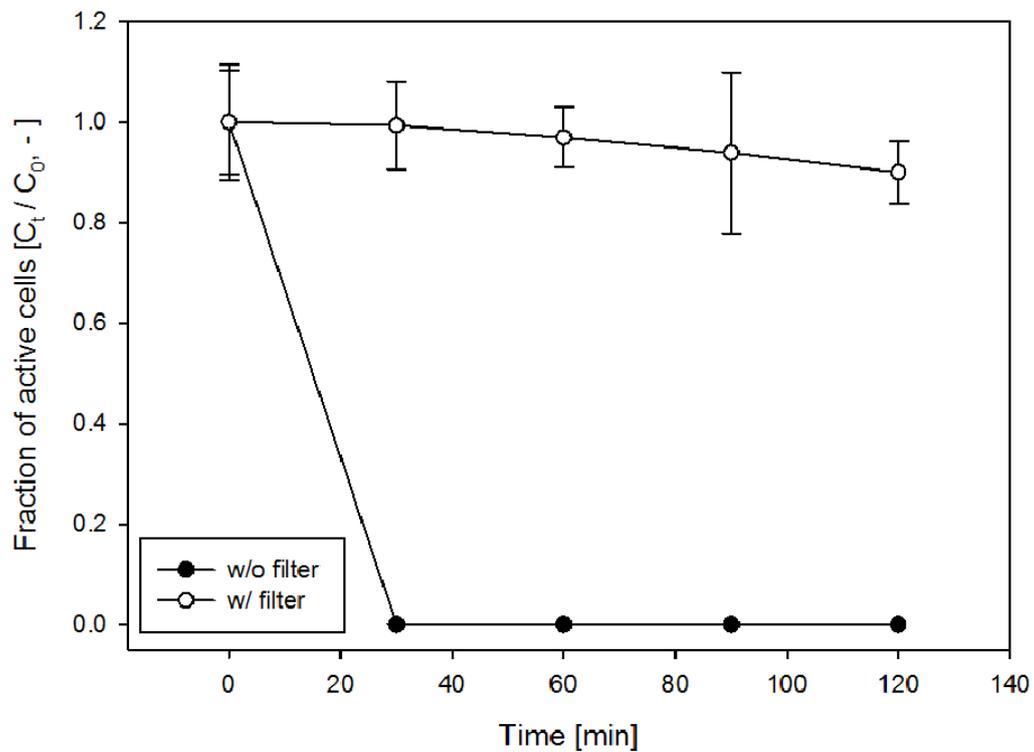
**Figure S1.** Estimation of surface area of a columnar, a granular, and a branched film. (a) Mimetic shapes of the columnar, granular and branched film. (b) Hexagonal packing arrangement of circles describing arrangement of plane bases of columns on the film and primary particles or plane bases of branches on the lateral surface of a column. (c) Hexagonal close packing of spheres for description of arrangement of primary particles in a column.



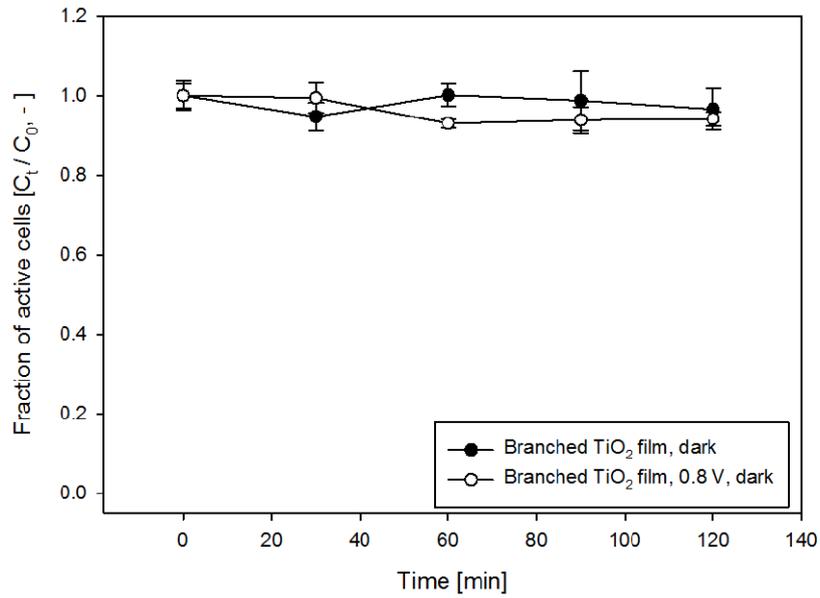
**Figure S2.** Light intensity of the arc Xe lamp operated by a 450 W power supply with and without a blue band pass filter. Blue shading indicates the area where photon energy of the light source ( $E_{ph}$ ) is higher than the bandgap energy of TiO<sub>2</sub> films ( $E_g$ ).



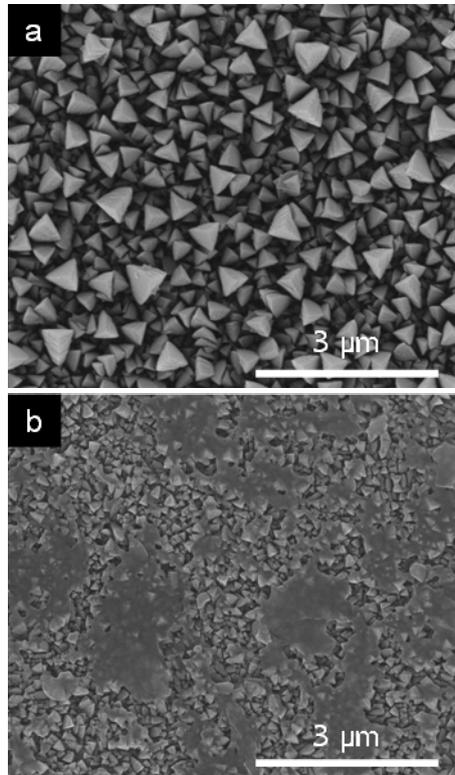
**Figure S3.** Effect of light only on *E. coli* viability with and without the blue pass filter.



**Figure S4.** Effect of TiO<sub>2</sub> film on *E. coli* viability with and without external voltage in the dark.



**Figure S5.** SEM images (top view) of columnar TiO<sub>2</sub> film (a) before and (b) after inactivation.



**Table S1.** Dimensions for estimation of surface area of films.

Diameter of deposition area of a film	11 mm
Height of a column	20 $\mu\text{m}$
Diameter of base circle of a column	0.5 $\mu\text{m}$
Diameter of primary particles of the granular structure	15 nm
Height of a branch	125 nm
Diameter of base circle of a branch	25 nm
Hexagonal packing density of circles	0.9069
Hexagonal close packing density of spheres	0.7405

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