

PHOTOCATALYTIC DEGRADATION OF CHOLESTEROL ON NANOCRYSTALLINE TITANIUM DIOXIDE

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Abstract

Titanium dioxide is a semiconductive photocatalyst, widely used in a variety of applications and products in the environmental and energy fields, including self-cleaning surfaces, air and water purification, sterilization, hydrogen evolution, and photoelectrochemical conversion. Thin films are prepared by sedimentation of TiO₂ nanopowder (nc-TiO₂) on fused quartz. This type of glass is chosen because it transmits light in the UV region of sufficient intensity. Therefore, cholesterol/nc-TiO₂/quartz system is irradiated from the top and also from the bottom and these results are compared. The samples are analyzed by secondary ion mass spectrometry after UV irradiation with UV LED diode with wavelength of 365 nm, every 15 minutes for 2 hours. The dependence of the peaks intensities corresponding to cholesterol fragments [M-OH]⁺, [M-H]⁺ and [M+CH₃]⁺, are observed, related to the UV light exposure time. Decrease the intensities of the [M-OH]⁺ and [M-H]⁺ molecular ions are similar in both measurements, during irradiation from the top also during irradiation from the bottom. These results suggest a similar effectivity of formation reactive species on nc-TiO₂ substrate. Comparing the peak intensities during irradiations from the top and from the bottom suggests that the irradiation from the bottom was slightly less effective. However, this reduction is very small and therefore, this method can also be used for the efficient degradation of organic contaminants on the surface of nc-TiO₂.

Keywords: Titanium Dioxide Nanopowder, Photocatalytic Degradation, Cholesterol

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