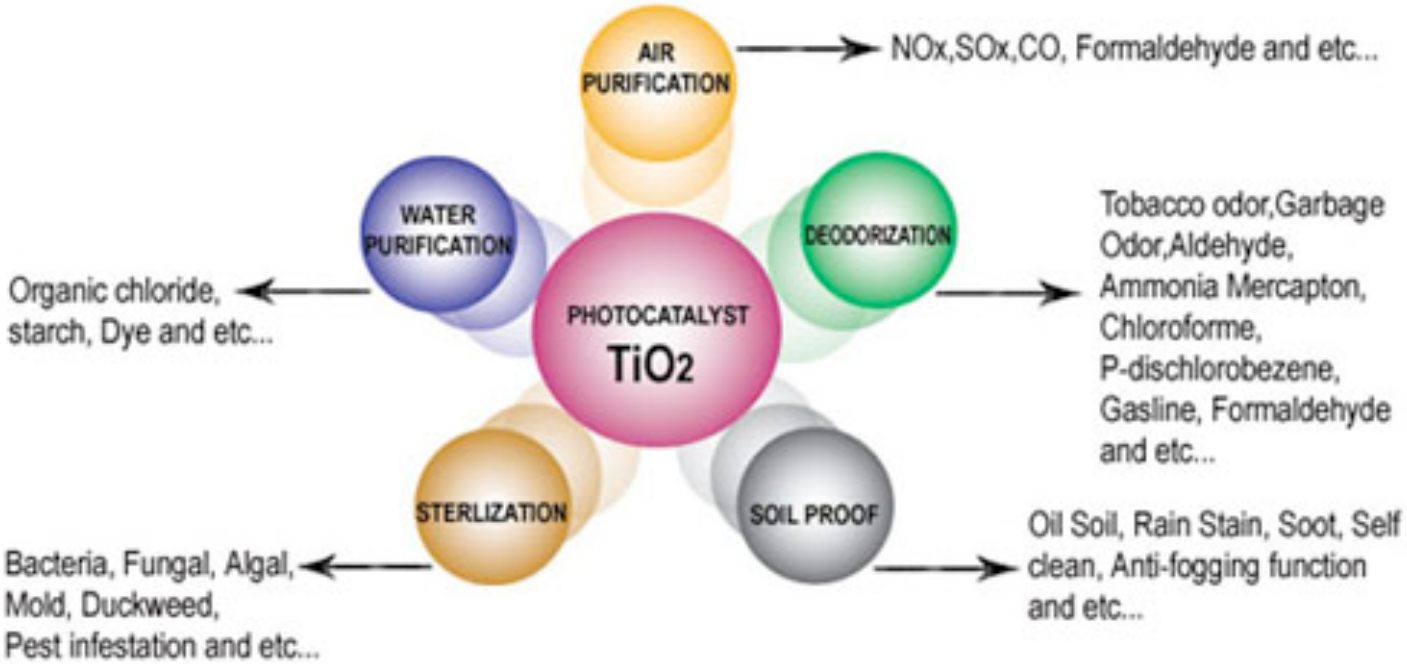
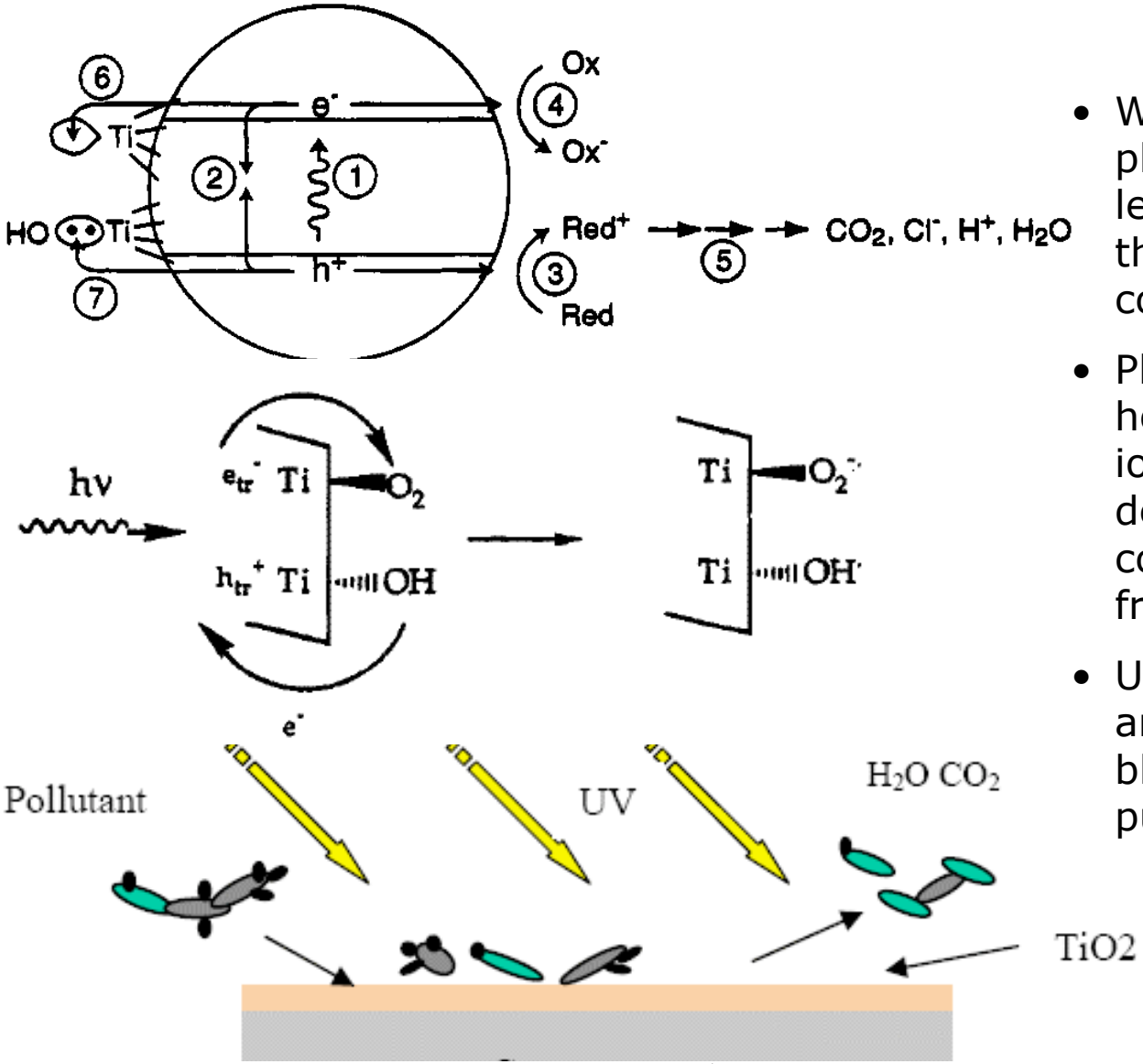
Tecnologías para la solución de problemas ambientales: fotocatalizadores basados en TiO_2



Federico J. Williams
Departamento de Química de Superficies / CINI Tenaris

How do semiconductor photocatalysis work?



- When TiO_2 is irradiated with photons of 420 nm (UV) or less an electron is exited from the valence band to the conduction band.
- Photo-generated electrons and holes produce super oxide ions and hydroxyl radicals that decompose toxic organic compounds with O_2 and H_2O from air.
- Uses: antibacterial, antimicrobial, antipollution, UV blocking in creams and purification of water.

Chem. Rev. 1995, 95, 69-96

Photocatalytic reaction of anatase and rutile films

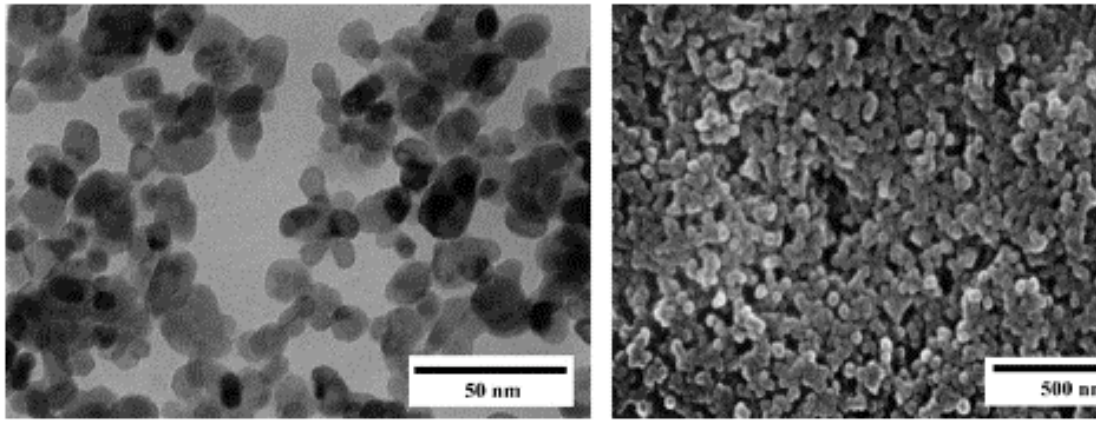
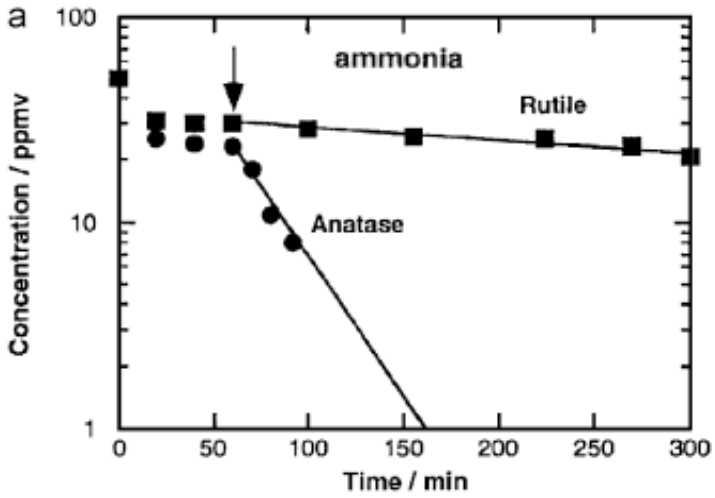
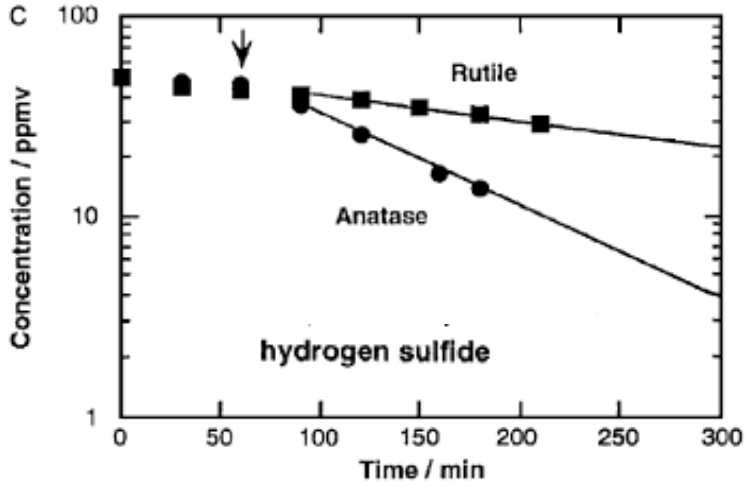


Fig. 1. TEM (left) and SEM (right) pictures of the anatase film.





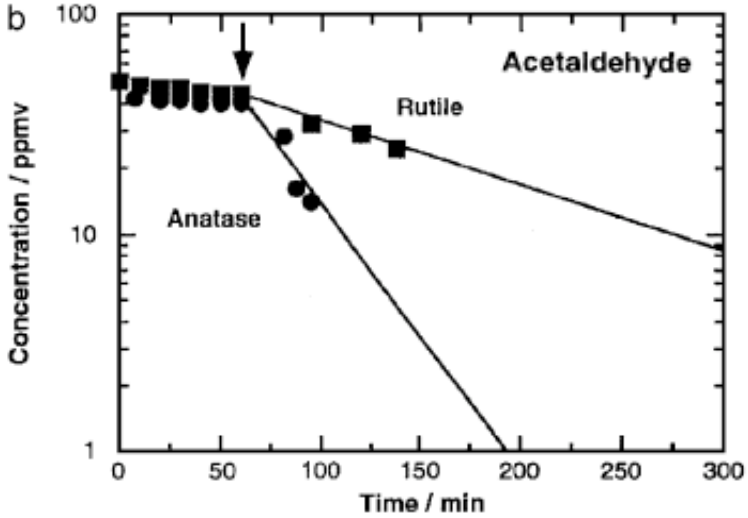


Fig. 4. Plots describing the decrease in concentration of ammonia (a), acetaldehyde (b), and hydrogen sulfide (c) as a function of irradiation time.

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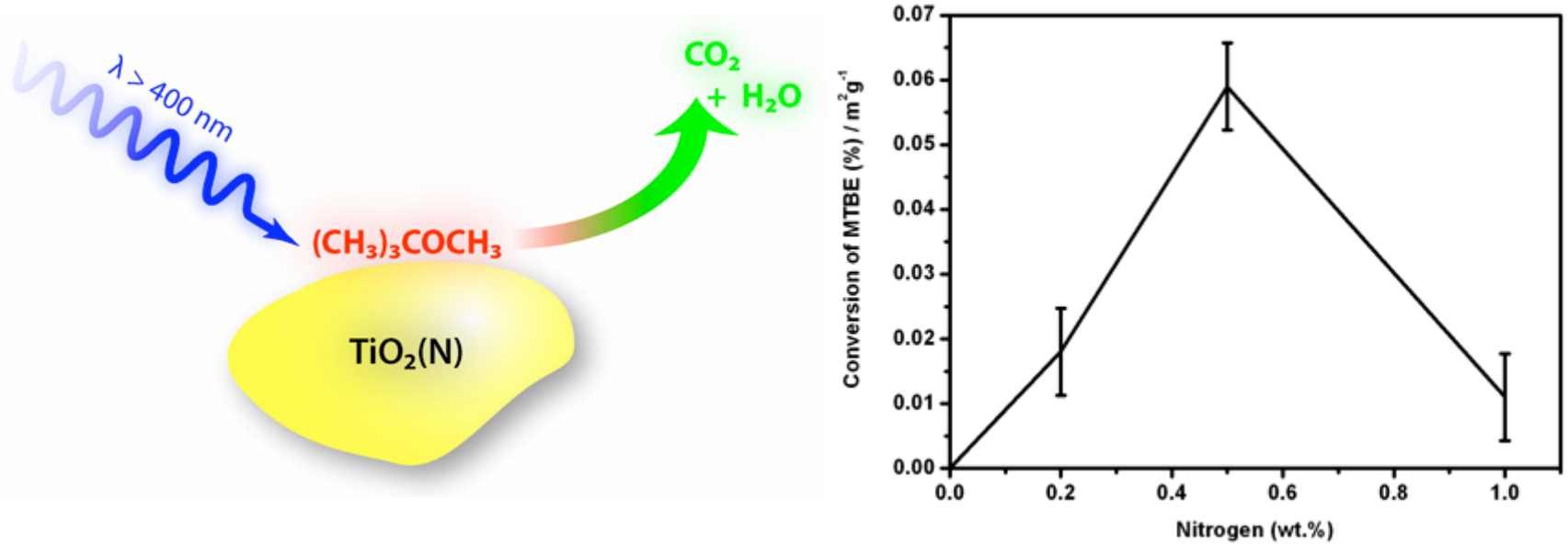
Visible light activity of modified TiO_2 towards MTBE degradation

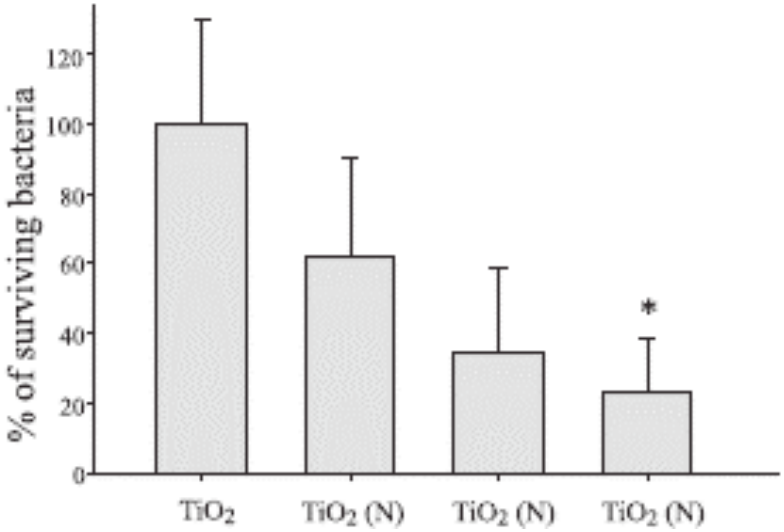


For the efficient utilisation of sunlight, a freely available source of energy, shifting the photoresponse of TiO_2 towards the visible region is an important task.

Novel materials that are extremely effective for the decomposition of methyl tertiary-butyl ether (MTBE) under visible light were developed.

S. In et al. *Chem. Commun.*, **2006**, 4236

Antibacterial coatings based on TiO_2 photocatalysts



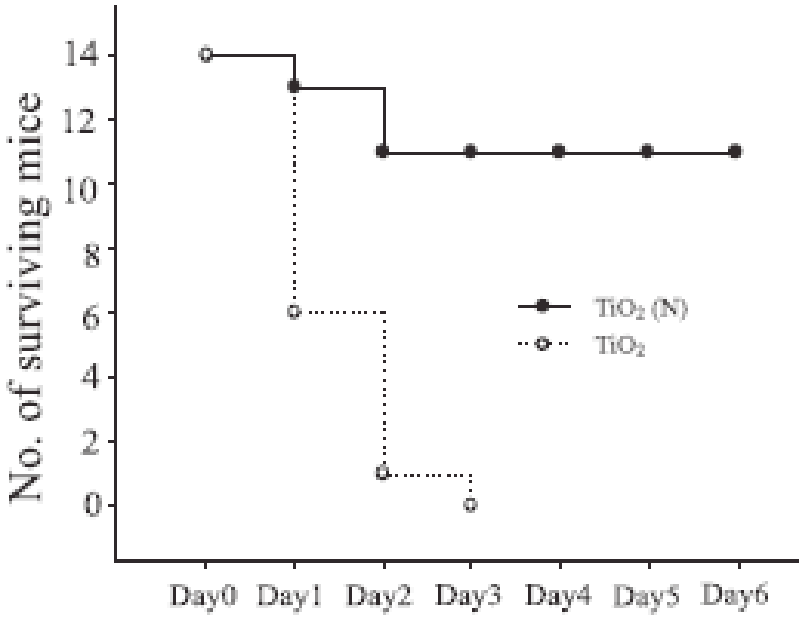
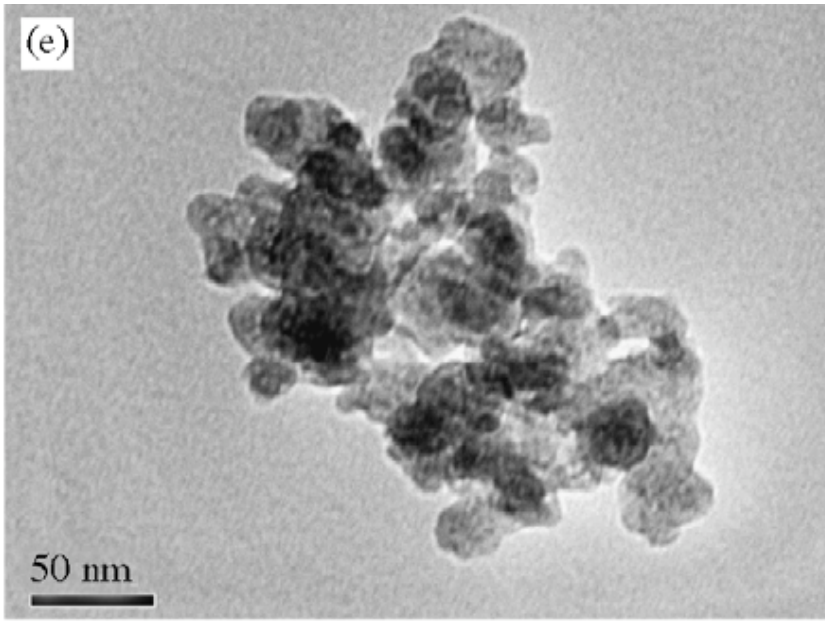


FIG. 5. Septic shock mouse model. Mortality of the C57BL/6J mice after intravenous injection of a lethal dose of *E. coli* (5×10^9 CFU) preexposed to TiO_2 or TiO_2 (N) substrates and visible-light illumination ($n = 14$).

APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Sept. 2006, p. 6111–6116

Magnetically separable photocatalyst: $Bi_{12}TiO_{20}$ / SiO_2 / $NiFe_2O_4$



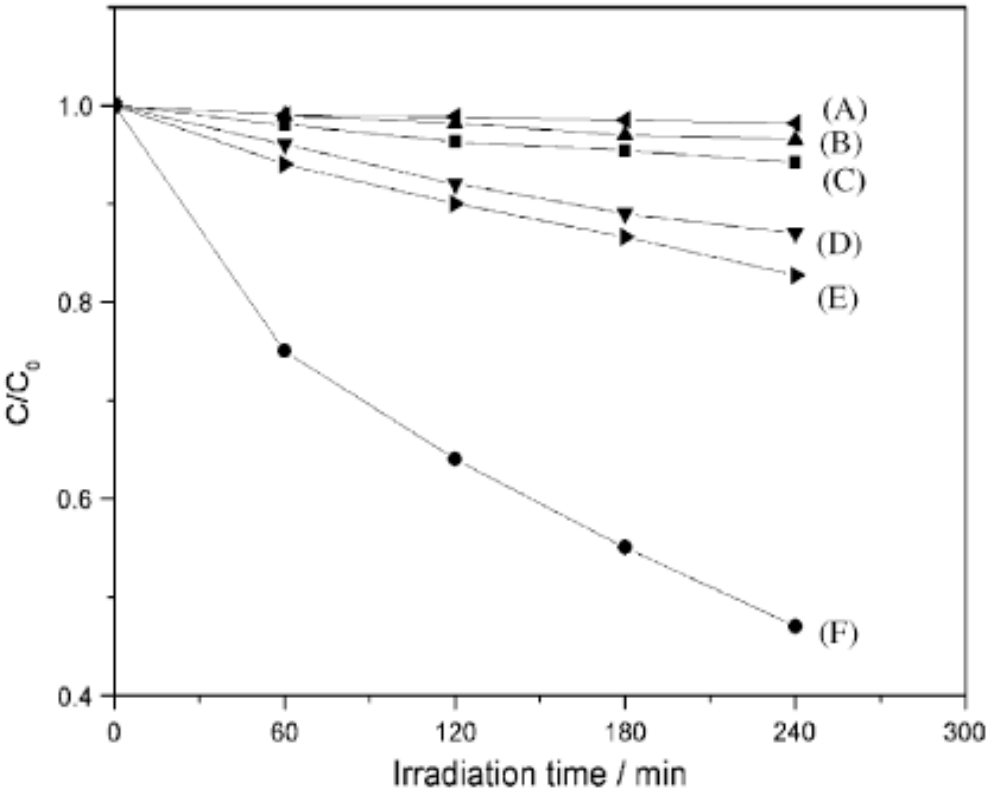


Fig. 8. Degradation of methyl orange (10 mg l^{-1}) with different photocatalysts under visible-light irradiation ($\lambda > 400$ nm): (A) blank; (B) SN (1.0 g l^{-1}); (C) BN (1.1 g l^{-1}); (D) P-25 titania (1.0 g l^{-1}); (E) BSN (1.1 g l^{-1}); (F) $Bi_{12}TiO_{20}$ (1.0 g l^{-1}).

good photocatalytic activity for the removal of organic pollutants in water under irradiation of **UV** and **visible** light.

S. Xu et al. / Science and Technology of Advanced Materials 8 (2007) 40–46

Photocatalytic Innovative Coverings Applications for De-pollution Assessment: The PICADA project

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