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Titanium Dioxide Photocatalysis

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Although the seminal work of Fujishima et al. dates back to 1971, TiO_2 still remains the most diffused and studied semiconductor, employed in photo-oxidation processes for cleantech (i.e., polluted water and air treatment), in solar fuel production (mainly hydrogen production by water photo splitting), and in Carbon Capture and Utilization (CCU) processes by CO_2 photoreduction.

The eleven articles, among them three reviews, in this book cover recent results and research trends of various aspects of titanium dioxide photocatalysis, with the chief aim of improving the final efficiency of TiO_2-based materials. Strategies include doping, metal co-catalyst deposition, and the realization of composites with plasmonic materials, other semiconductors, and graphene. Photocatalysts with high efficiency and selectivity can be also obtained by controlling the precise crystal shape (and homogeneous size) and the organization in superstructures from ultrathin films to hierarchical nanostructures. Finally, the theoretical modeling of TiO_2 nanoparticles is discussed and highlighted. The range of topics addressed in this book will stimulate the reader's interest as well as provide a valuable source of information for researchers in academia and industry.

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