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The influence of rutile particles on photo-induced activity of the sol-gel TiO₂/ITO photoanode

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Titanium dioxide (TiO₂) particles, mainly in anatase phase, immobilized to the thin layer form have found various applications in the gas sensors, photovoltaics, photocatalysis and photo-electrocatalysis due to its chemical and photo-chemical stability, as well as good photo-electrochemical properties. These applications require excellent charge separation and electron transport. It was found that the mixed crystallographic phase of anatase and rutile can exhibit a much higher photo-induced activity than the pure anatase or pure rutile form. The reason is that the photo-induced electrons can easily transfer from the anatase surface states to rutile, as well as from the anatase conduction band to rutile. These factors are responsible for better photocatalytic activity and for higher photo-current generated after illumination by the UV light. In this contribution the rutile effect on the structural and photo-electrochemical properties as well as on photocatalytical activity was studied.

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