

Anodization pre-treatment influence on growth facilities of TiO₂ nanotube arrays

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Titanium dioxide has gained wide range interest of scientific community due to its growth and photocatalytic properties. If the titanium dioxide nanotubes can be synthesized by sol-gel, thermal hydrolysis and other methods, self-ordered oriented nanotube coating can only be obtained by electrochemical anodizing method. By anodizing titanium foil in fluoride containing electrolytes it is possible to gain highly ordered and good quality TiO₂ nanotube coatings to be used for both photo-catalysis of water splitting and environmental decontamination under the influence of sunlight.

Initial parameter such as electrolyte composition, pH, temperature and overall anodization time influence on obtained array morphology have been explored in recent years [1–3], thus influence of anodization pre-treatment is still not clear. Electrodes are set in electrolyte and anodization process is started with pre-set polarisation voltage. This work focuses on first few minutes of anodization and its correlation with nanotube array growth and parameters, using different low voltages and initial relaxation time in electrolyte.

After putting electrodes in electrolyte low input voltage is set for certain amount of time, then anodization main voltage is set. By manipulation of voltage we manipulate with oxide growth rate and nanostructure of an array. Morphology of obtained samples is investigated with electron microscopy and structure with x-ray diffraction and Raman spectroscopy. By exploring SEM images and anodization parameters conclusions of pre-treatment parameter influence on TiO₂ nanotube array growth is made.

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References

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