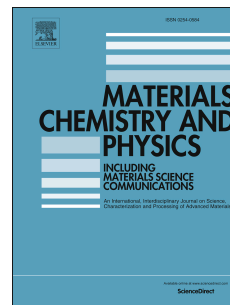


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Synergetic catalytic properties of gold nanoparticles planted on transparent titanium dioxide nanotube array bed

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Abstract:

To improve the photo-induced catalytic activity of Au nanoparticles and enhance the adhesion between Au nanoparticles and the substrate, a layer of TiO₂ nanotube array was fabricated on F doped tin oxide conductive glass by combining magnetron sputtering method with anodic oxidation technology before the Au nanoparticles were deposited by vacuum thermal evaporation of Au. The structure, compositions and optical property of the as-prepared materials were characterized by grazing incidence X-ray diffraction, scanning electron microscopy, transmission electron microscope and UV-Vis spectrophotometer. Catalytic properties of all samples were evaluated by testing the anodic oxidation of methanol in the alkaline electrolyte. Due to the synergetic catalytic properties of titanium dioxide nanotube array and Au nanoparticles, dramatic improvements in electro-catalytic ability (2.4 ×), photo-induced electro-catalytic activity (7.94 ×) and durability were realized in comparison with Au/FTO electrode, suggesting a facile method to improve the catalytic ability and durability of noble metal catalyst.

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