THE STUDY AND OPTIMIZATION OF TITANIUM DIOXIDE (TiO_2) NANOSTRUCTURES BY RF MAGNETRON SPUTTERING

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ABSTRACT

THE STUDY AND OPTIMIZATION OF TITANIUM DIOXIDE (TiO_2) NANOSTRUCTURES BY RF MAGNETRON SPUTTERING

Radio Frequency (RF) magnetron sputtering is one of the method to produce Titanium dioxide (TiO_2) nanostructures. Where, mixture of argon and oxygen gas are used as the main sputtering to strike the solid target material which is pure TiO_2, to eject the atoms in the target material for deposition of TiO_2 nanostructures. Meanwhile, to study the optimization of TiO_2 nanostructures, it can be deposited by controlling the parameters of RF magnetron sputtering such as RF power and sputtering pressure. Then, the properties of TiO_2 nanostructures can be determined by using Atomic Force Microscope (AFM), Field Emission Scanning Electrons Microscope (FESEM) and Ultraviolet-visible Spectroscopy (UV-Vis).

For the samples of varies RF power, the optimum TiO_2 nanostructures was deposited at 200 W (P20). Where, the sample of P20 has the lowest surface roughness (0.166 nm) and the smallest TiO_2 size particles (36.3 nm) with the indirect optical band gap of 3.39 eV. While for the samples of varies RF pressure, the optimum TiO_2 nanostructures was deposited under working pressure of 11 mTorr (P11) which also has the lowest surface roughness (0.202 nm), the smallest TiO_2 size particles (24.1 nm) with the value of indirect optical band gap of 3.41 eV.

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