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Department of Laser and Optoelectronic Engineering

Modification of Conventional Photoanode with Oxide Nanoparticles

A Thesis Submitted to
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ABSTRACT:

In this thesis, four dye-sensitive photodetectors were prepared, consisting of three layers: the photoanode layer, represented by titanium dioxide deposited on the surface of fluoride tin oxide (FTO) glass using the pulsed laser ablation (PLA), the second layer, the photosensitive dye, represented by the organic dye Rhodamine, and the third layer, represented by the photocathode layer, represented by the deposited platinum using DC sputtering method on the surface of the FTO glass, there is an electrolyte solution between them.

As for the rest of the prepared photodetectors, they consist of a photoanode layer doped with graphene concentrations of (1%, 3%, 5%), a dye layer, and the last layer is a platinum layer deposited on the surface of a fluoride tin oxide glass.

The structural properties (X-ray diffraction, current-voltage properties, emission field of scanning electron microscope and ultraviolet-visible radiation) and optical properties (photoresponsivity, photodetectivity, quantum efficiency, response time and recovery time) of the prepared photodetectors were studied.

The results of the X-ray diffraction showed that the prepared films had a polycrystalline structure. Some photodetector measurements were calculated, the best current in the dark area was found to be 0.04mA when the voltage was from -5 to 5 volt. The optimum external quantum efficiency was found 16% when photoanode doped consecration 5% of graphene.

We noticed that the optimum value of the photocurrent was at a wavelength of (350,550)nm.