

Sensitive photodetector based on transparent oxides

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Abstract: Recently transparent and conductive transparent metal oxide films are receiving more attention because of their properties such as light-emitting semiconductivity, possessing high value of exciton binding energy, etc. Due to these properties the films have been used in varieties of applications such as high temperature thermoelectric device fabrication, active emitter in LED and laser diodes, TFT for real-time sensing of gas molecules, acoustic sensors, etc. Being at the beginning of our investigation, our main task consists of obtaining thin metal oxides films (Me_xO_y) (where Me are Sn or Zn) undoped and doped with different additives [1-4]. The thin films were deposited on glass and silicon substrates by spray pyrolysis technique. The specific amount of dopant (In, Mo) influences the conductivity, the transparency and the electrical resistivity of the films.

The microstructure and morphology were studied by XRD, SEM, Raman and AFM techniques. Spectrophotometer UV-VIS in the region of 300-1800 nm was used to study the transmission spectra of the films. $\text{Si-SiO}_2\text{-Me}_x\text{O}_y\text{: (In, Mo)}$ structures were prepared and the lateral photoeffect was investigated. Under nonuniform irradiation with a laser beam, a lateral photovoltage (LPV) appeared, with high sensitivity to the spot position on the plane of the metal oxide film. The LPV depends on the conductivity and optical transmittance of the films. The position characteristic shows good linearity and resolution and could be useful for practical applications.

Keywords: Thin films, Spray pyrolysis, Metal oxides, Position sensitive photodetector.

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