

## The Development of Solar Cells to Maximize the Utilization of Solar Energy in Al-Baha Area

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**Abstract :** Transparent conducting oxides (TCOs) possess low resistivity, exhibit good adherence to many substrates, and have good transmission characteristics from the visible to near-infrared wavelengths, which make it useful for various applications. Thin films of transparent conducting oxide (TCO's) have received much attention because of their wide applications in the field of optoelectronic devices. Advancement of transparent conducting oxides TCO's may not only lie within the improvement of existing materials in use, but also the development of novel materials. Solar cells are devices, which convert solar energy into electricity, either directly via the photovoltaic effect, or indirectly by first converting the solar energy to heat or chemical energy. Solar power has attracted attention of late as the most advanced of the alternative energy resources. The project aims to access the solar energy in Al-Baha region by search for materials (transparent-conductive oxides (TCO's)) to use in solar cells with highly transparent to the solar spectrum, have low electrical resistivity, be stable under H-plasma, and have a suitable structure in particular for a-Si solar cells. As the PV surface is exposed to the sunlight, the module temperature increases. High ambient temperatures along with long sunlight exposure time increases the temperature impact on PV cells efficiency. Since Al-Baha area is characterized by an atmosphere and pressure different from their counterparts in Saudi Arabia due to the height above sea level, hence it is appropriate to do studies to improve the efficiency of solar cells under these conditions. In this work, some ion change materials will be deposited using either sputtering/ or electron beam evaporation techniques. The optical properties of the synthesized materials will be studied in details for solar cell application. As we will study the effect of some dyes on the optical properties of the prepared films. The efficiency and other parameters of solar cell will be determined.

**Keywords :** thin films, solar cell, optical properties, electrical properties

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