# ABSTRACT

The demand for clean and renewable energy has been constantly increased all over the world. Therefore, harnessing solar energy from the sun to generate electricity using solar cells was the main focus which has been achieved by exerting more effort into
research. Solar energy is converted directly into electricity by solar cells. In this research, the thin films of As40Se60-xSnx were prepared by thermal evaporation technique.
XRD has been estimated the amorphous nature of As40Se60-xSnx (x = 0, 5, 10, 15 and 20 at. %) thin films. XRD pattern shows that the investigated films have two broad peaks which are ascribed to the two amorphous phases existence. The optical characterization of these films has been performed throughout the estimation of the refractive index, optical band gap, dielectric constants, and energy loss functions. It was found that the refractive index and the dielectric constants increase while the energy gap decreases with the increment of Sn content for the studied thin films. The increase of the refractive index may be attributed to the increasing polarizability of the Tin when it is comparing with selenium. It has become apparent that the optical bandgap of the studied films decreased from 1.751 to 1.511 eV as the Sn content
increases from 0 to 20 at.%. This behavior is illustrated in terms of the Urbach energy which is found to increase
with the increase of Tin (Sn) content and, therefore, leads to shrinking of the bandgap. The values of two energy loss functions SELF and VELF are increased in the high
photon energy region for the investigated films. SELF and VELF values have been found to shift toward the high photon energy with increasing tin content. Other physical
parameters such as average coordination number, average heat of atomization, numbers of lone pairs electrons, and cohesive energy have been determined all of these
parameters have increased with increasing of the Sn content, which may refer to increasing the glass stability of these compositions. Finally, the optical dispersion, phase, and group velocity are discussed based on the refractive index dispersion of the studied thin films. There is limited information onAs40Se60-xSnx thin films for solar cell applications.
This study was aimed at investigating both the optical and electrical properties of As40Se60-xSnx thin films using by thermal evaporation technique method. In addition to
investigation of the opto-electric properties, this study was aimed at improving these properties as well as to provide additional information on the As40Se60-xSnx solar cell.