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Modulation of thermoelectric properties of GeSeIn thin films by annealing in oxygen environment

The manuscript demonstrated an annealing technique to modulate the thermoelectric properties of GeSeIn thin films grown on Si substrate by thermal evaporation. The grown samples were annealed at various temperatures from 600-800 OC in air using programmable furnace to variation in Seebeck coefficient and power factor. The XRD data confirmed the amorphous nature of GeSeIn glasses because no XRD peak was observed in as grown sample. But annealing process developed a temporary crystalline phase of GeSe having (016) plane which again disappeared at annealing temperature 900 OC. Raman spectroscopy measurements revealed a strong peak at 520 cm⁻¹ due to Si substrate along with the couple of other peaks which are related to GeSeIn structure. The Seebeck data suggested that as grown sample has highest value of Seebeck coefficient (120 μV/OC) but it decreased from 110-20 μV/OC as the annealing temperature increased from 600-800 OC. The decreased in Seebeck coefficient with annealing temperature is due to decrease of carrier concentration. The Hall measurements demonstrated that the value of electrical conductivity remains almost constant (110-115 S/cm) for all samples annealed at various

temperatures. This constant value of electrical conductivity is due to decrease of carrier concentration and increase of carriers mobility with annealing temperature.

Keywords: GeSeIn thin films, Thermal evaporation, XRD, Raman spectroscopy, Seebeck Effect, Hall Effect.

Biography

Jolly Jacob is currently the Chair of the Department of Applied Sciences and Professor of Chemistry at Abu Dhabi University, UAE. She has taught at the university level for thirty-two years. Before joining Abu Dhabi University in 2010, she held the position of Associate Professor and Head of the Department of Chemistry in the affiliated college of University of Mumbai. She holds a PhD in Chemistry from the University of Mumbai. Having a wide range of experience in the field of Chemistry, she has a strong academic record and holds a Gold medal for her M.Phil. In addition, she has published over 90 research papers in the peer reviewed international journals with high impact factor. She is a board member of the American Chemical Society, UAE chapter, and a member of the editorial boards of several reputed international journals. She has presented papers in several international conferences, has served on the editorial board of numerous international conferences, and is a member of the organizing committee of several international conferences.

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