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Crystallization of Germanium for Use in Low-Cost Solar Cells[1]
CHRISTEN RACCIATO[2], University of Dallas, PHIL AHRENKIEL[3], South Dakota School of Mines and Technology — Solar cells with a Germanium substrate can reach 40% efficiency on earth with the aid of solar concentrators; however, Ge is expensive, meaning that these high-efficiency cells are feasible only for extreme applications such as outer-orbit missions. The purpose of this research is to determine if annealing Ge thin films may be a possible, low-cost alternative to slicing large, thick wafers of Ge for solar cells. Samples of Ge were deposited on transmission electron microscope (TEM) grids through vacuum evaporation, annealed at various temperatures and lengths of time in a tube furnace, and then analyzed through the TEM to test the annealed thin films. This tests the ease of crystallization in Ge, and if the size of the grains is reasonable. It was found that the Ge crystallized at relatively cost-effective temperatures, specifically temperatures over 400 C with moderate grain sizes reaching 7μm. Experiments to evaluate whether grains of the size obtained can support a photovoltaic layer will be conducted in later research.

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