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Nanocrystalline silicon thin films for thermoelectric applications¹

DANIEL QUEEN, BATTOGTOKH JUGDERSUREN, JIM CULBERSTON, Naval Research Laboratory, QI WANG, WILLIAM NEMETH, National Renewable Energy Laboratory, TOM METCALF, XIAO LIU, Naval Research Laboratory — Recent advances in thermoelectric materials have come from reductions in thermal conductivity by manipulating both chemical composition and nanostructure to limit the phonon mean free path. However, wide spread applications for some of these materials may be limited due to high raw material and integration costs. In this talk we will discuss our recent results on nanocrystalline silicon thin films deposited by both hot-wire and plasma enhanced chemical vapor deposition where the nanocrystal size and crystalline volume fraction are varied by dilution of the silane precursor gas with hydrogen. Nanocrystalline silicon is an established material technology used in multijunction amorphous silicon solar cells and has the potential to be a low cost and scalable material for use in thermoelectric devices.

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