Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Thermal Conductivity of Nanocrystalline Silicon Prepared by Chemical-Vapor Deposition[1] BRIAN KEARNEY[2], Natl Research Council, XIAO LIU, Naval Research Labaratory, Code 7130, BATTOGTOKH JUGDERSUREN[3], Sotera Defense Solutions Inc., DANIEL QUEEN[4], Natl Research Council, THOMAS METCALF, Naval Research Labaratory, Code 7130, JAMES CULBERTSON, Naval Research Labaratory, Code 6876, CHRISTOPHER CHERVIN, Naval Research Labaratory, Code 6171, RHONDA STROUD, Naval Research Labaratory, Code 6366, WILLIAM NEMETH, QI WANG[5], National Renewable Energy Laboratory — Thin film nanocrystalline silicon prepared by chemical-vapor deposition is an established material used in multijunction amorphous silicon solar cells. Its potential in low cost and scalable thermoelectric applications depends on the reducing grain sizes to nanometers while simultaneously maintaining a high crystalline to amorphous ratio. In this work, we show that by varying the hydrogen dilution of silane gas flow during deposition, we can reduce average grain sizes to a few nanometers while still maintaining $\sim 90\%$ crystallinity of the material. Annealing at 600 °C improves crystalline content with only a small increase of the grain sizes. The values of thermal conductivity, measured from 85 K to room temperature as function of hydrogen dilution ratio from full amorphous to nanocrystalline silicon, remain at a level that is typical for amorphous silicon.

[1]Office of Naval Research
[2]NRC Postdoc
[3]Contractor
[4](Former) NRC Postdoc
[5]Was at NREL for collaboration, no longer there

Brian Kearney
Natl Research Council

Date submitted: 13 Nov 2014 Electronic form version 1.4