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Magneto Themoelectric Generator with Carbon Nanotube Thermal Interfaces PATRICK T. MCCARTHY, TIMOTHY S. FISHER, School of Mechanical Engineering and Birck Nanotechnology Center, Purdue University, 1205 West State Street, West Lafayette, IN 47907, USA, ERNESTO E. MARINERO, School of Materials Engineering, Purdue University 701 West Stadium Avenue, West Lafayette, IN 47907 and HGST San Jose Research Center, 3404 Yerba Bue — We report the thermal behavior of Gd foils used in a magneto thermoelectric generator cells. The device exploits the ferromagnetic phase transition of gadolinium to drive the movement of a diaphragm "shuttle" whose mechanical energy is converted to electrical form and which enhances heat transfer through both conduction and convection. Efficient heat transfer at mechanical interfaces is critical to increase shuttle speed and the commensurate rate of heat transfer. The synthesis and characterization of carbon nanotube thermal interfaces for the Gd foils are described. The samples generated in this study were consistently measured with total thermal interface resistances in the range of 65–105 mm^2 K/W, a reduction of 55–70% compared to bare Gd ($R_{int} \sim 230$ mm^2 K/W). The addition of carbon nanotube arrays did not alter the magnetic properties of the gadolinium foils and only a slight decrease in the magnetic moment of the gadolinium samples (8–13%) was measured after growth.

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