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Emission Testing Results of Thermally Stable, Metamaterial, Selective-Emitters for Thermophotovoltaics KATHERINE LEVINSON, NORIHITO NAKA, NICOLE PFIESTER, ABIGAIL LICHT, TOM VANDERVELDE, Tufts — In thermophotovoltaics, the energy from a heated emitter is converted to electricity by a photovoltaic diode. A selective emitter can be used to emit a narrow band of wavelengths tailored to the bandgap of the photovoltaic diode. This spectral shaping improves the conversion efficiency of the diode and reduces undesirable diode heating. In our research, we study selective emitters based on metamaterials composed of repeating nanoscale structures. The emission characteristics of these materials vary based on the compositional structure, allowing the emitted spectrum to be tunable. Simulations were performed with CST Microwave Studio to design emitters with peak wavelengths ranging from 1-10 microns. The structures were then fabricated using physical vapor deposition and electron beam lithography on a sapphire substrate. Emitter materials studied include gold, platinum, and iridium. Here we report on the emission spectra of the selective emitters and the post-heating structural integrity.

Katherine Levinson
Tufts

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