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## Solid state thermal power conversion: A 21<sup>st</sup>-century solution to a 19<sup>th</sup>-century problem

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The vast majority of power generation in world today is produced through the same process as it was in the late-1800s: heat is applied to water to generate steam, which turns a turbine, which turns a generator, generating electrical power. In our lab, we are developing a solid-state power generation process that is more befitting the 21<sup>st</sup>-century. Thermophotovoltaic (TPV) cells directly convert radiated thermal energy into electrical power, through a process similar to how the more familiar photovoltaics work. These TPV generators, however, include more “host-machinery” that solar cells do not incorporate. These components, selective-emitters and filters, shape the way the radiated heat is transferred into the TPV cell for conversion and are critical for its efficiency. Here, we will discuss the work we are performing to improve the components in these systems, which will enable TPV generators to be used with nearly any thermal source for both primary power generation and waste heat harvesting.

### Biography

Professor Tom Vandervelde has always worked across disciplinary boundaries. When he earned his PhD in Physics from University of Virginia, his advisor was in the Electrical Engineering Department and his fellowship was from the Materials Science Department. Presently, he is an associate professor in Electrical Engineering, and has Adjunct positions in Mechanical Engineering and the Physics and Astronomy Department. Additionally, Tom runs the Materials Science and Engineering program at Tufts. He is also the director of the Tufts Interdisciplinary Advanced Materials (TIAMAT) Center, Tufts Epitaxial Core (TEC) Facility, and Renewable Energy and Applied Photonics Laboratories. He has published over 100 papers and 150 presentations and has served on multiple editorial boards.

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