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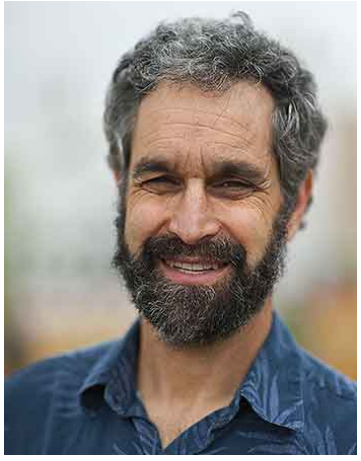

Advanced optics and photonics for buildings and solar energy at ARPA-E

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Former National Renewable Energy Laboratory Research Fellow (NREL)

Key technology challenges in building efficiency and solar energy utilization require transformational optics, plasmonics and photonics technologies. After introducing the U.S. Department of Energy's Advanced Research Projects Agency – Energy (ARPA-E), I will describe some advanced optical technologies funded by ARPA-E. The technologies for buildings include a passive daytime photonic cooler and dual-band electrochromic windows based on plasmonic absorption. The solar technologies include novel hybrid energy converters that combine high-efficiency photovoltaics with concentrating solar thermal energy collection and storage. Because the cost of high-temperature thermal energy storage is low, these systems have the potential to generate inexpensive and dispatchable solar energy that can be deployed when the sun is not shining. The solar technologies under development include systems based on spectrum splitting by plasmonic nanoparticles and Rugate interference filters, and photovoltaic cells that can operate efficiently at over 400°C.

From 2012 to 2015, Howard Branz served as a Program Director at the Advanced Projects Research Agency – Energy. At ARPA-E, he selected and incubated more than $70M of interdisciplinary technologies with transformational potential. As Program Director, he led a "virtual research center" of 28 projects across more than 100 U.S. industrial, national laboratory and university teams. Branz created ARPA-E's first solar conversion program, combining thermal storage with PV to address the challenge of producing low cost, low carbon, dispatchable electric power.
Before joining ARPA-E, Dr. Branz was a Research Fellow and group leader at the U.S. National Renewable Energy Laboratory (NREL). During more than 25 years at NREL, Branz led research groups to discoveries and new technologies in photovoltaics, nanotechnology, electrochromic windows, semiconductor devices, defect physics, electronic transport, optics, epitaxy, photoelectrochemistry, and materials science. Branz is a Fellow of the American Physical Society.

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Case Western Reserve University, Cleveland, Ohio 44106

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