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The terawatt photovoltaic energy challenge: Status, recent advances and materials by design

Meeting our future global energy needs in a sustainable manner constitutes one of the greatest challenge the world is facing in the 21st century and will require advances in energy conversion, delivery, storage and utilization. Solar energy, particularly photovoltaics, can meet much of the world's energy demands. Remarkable improvements in the performance, efficiency, costs and reliability are leading to phenomenal growth in deployment of photovoltaics energy worldwide; however, it only accounts for a small portion of total energy production today. This talk will provide an overview of the current status of photovoltaic solar cell technology along with remaining technical challenges for the development and deployment of the needed terawatts of solar energy. Key advances and remaining barriers for materials, devices and systems that span commercial, emerging and new technology platforms will be presented. We will provide an overview of NREL's extensive program in photovoltaic research, development and deployment that aims to address the US Department of Energy SunShot goals as well as efforts to further decrease the costs of solar energy (i.e. beyond grid parity). The discovery of new functional materials is critical to developing disruptive technologies. Key results on materials by design from the next generation for materials by design (CNGMD) Energy Frontier Research Center (EFRC) will be presented, where we tightly couple theory, experiment and characterization to discover and understand new inorganic semiconductor materials for photovoltaic absorbers, transparent conductors, photoelectrochemical water splitting and related applications.

Biography

William Tumas is the Associate Laboratory Director for Material and Chemical Science Technology at the National Renewable Energy Laboratory (NREL) with R&D on solar energy, hydrogen, energy storage, fuel cells, materials science, chemical/nanosience and technology reliability. He is the Director of the Center for Next Generation of Materials by Design (CNGMD) EFRC. Prior to NREL, he has spent 17 years at Los Alamos National Laboratory. He has worked at Dupont Central Research for 6 years after a Post-doctorate at Caltech and a PhD from Stanford University.

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