



UT welcomes two new faculty to photovoltaics research and education

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Two new faculty members, Dr. Yanfa Yan and Dr. Nikolas Podraza, have joined UT's hub of the Wright Center for Photovoltaics Innovation and Commercialization (PVIC). The two faculty positions were created in the Department of Physics and Astronomy with funds competitively awarded to UT via the Ohio Research Scholars Program (ORSP). Through these additions, the University of Toledo continues to strengthen education, research, and industry partnerships in the area of photovoltaics (PV) – the technology that enables the production of clean, quiet, and carbon-free electricity from sunlight.

Dr. Yanfa Yan joins UT as a Professor of Physics and the ORSP Endowed Chair in Photovoltaics, while Dr. Nikolas Podraza comes to UT as an Assistant Professor of Physics. Drs. Yan and Podraza bring unique and complementary experience to the existing UT PVIC team, broadening and strengthening UT's already world-renowned expertise in the area of thin film PV. Thin film solar cells use inexpensive processes and thin semiconductor layers to absorb sunlight efficiently, resulting in the lowest-cost solar electricity presently available.

"UT's Wright Center for PV Innovation and Commercialization (PVIC) attracted me to UT," said Yan. "The large and growing number of solar cell companies in the Toledo area help to drive UT's strong PV research and education program. My interests lie at the intersection between academia and industry, where we can combine the industry's needs for rapid advances and problem solving with the PVIC's creative and innovative research ideas and solutions."

Dr. Yan joins UT following 12 years as a thin film solar cell scientist on the staff of the National Center for Photovoltaics, part of the National Renewable Energy Laboratory (NREL) in Colorado. Dr. Yan has received numerous awards for outstanding research, holding research positions at Oak Ridge National Laboratory (Tennessee), Tohoku University in Japan, and the French National Centre for Scientific Research (CNRS) in Paris. Dr. Yan aims to combine his expertise in theoretical and experimental research to improve existing PV technology and to develop new materials with the potential to further lower the cost of solar electricity.

"UT's perspective on photovoltaic research is what brought me here," said Dr. Podraza. "Specifically, important opportunities arise from the direct connection formed between UT's PV

research program and regional and national companies. It helps us to affect real world problems.”

Dr. Podraza received his Ph.D. in 2008 from UT under the supervision of Distinguished University Professor of Physics, Dr. Robert Collins. Podraza spent three years at Penn State University’s Materials Research Institute, where he developed his extensive expertise in applying optical measurements to thin film materials -- a process critical to the understanding, design, and manufacture of high efficiency solar cells. Podraza has taught classes in Physics and Engineering since 2003, and at Penn State, he mentored students en route to their PhD’s in these subjects. As a longtime member of the academic community, he has conducted numerous manuscript reviews as a referee for journals such as Applied Physics Letters, Journal of Non-Crystalline Solids, Journal of Electronic Materials, Materials Science in Semiconductor Processing, Review of Scientific Instruments, and Thin Solid Films.

“Working in a place like Toledo, which has a history in manufacturing products essential to the PV industry, is incredibly useful. Toledo’s PV community understands what is needed to support the development of a new manufacturing base within this challenging economic climate.”

Both Yan and Podraza believe that we will increasingly use sunlight to generate electricity, and eventually, fuels. “We’re in an energy crisis right now,” said Podraza, “and PV, along with other renewable energy sources are what are going to get us through this as a society.”

“It is forecasted that over 30 terra Watts (10^{12} watts) of power will be needed globally by 2050,” said Yan. “To maintain atmospheric CO₂ concentrations near their current level and avoid further harm to environment and human health, the majority of the new power must come from renewable energies that do not rely on fossil fuels such as coal. Photovoltaic solar electric technology is considered the top choice of renewable energies. Once the solar cell module is produced, the ‘fuel’ to run it is free from the Sun.”

Thin film solar cells will continue to lead the way as an affordable and effective way of harnessing this energy needed for the present day as well as the future. “Thin film holds the greatest potential for achieving large scale deployment at low cost,” said Yan.

“Not only are thin film solar cells cheap,” adds Podraza, “but they point the way into new, important scientific problems that we can solve to make even cheaper PV technologies. We have numerous new areas in which to study.”

Both faculty members will teach within UT’s new School for Solar and Advanced Renewable Energy (SSARE), and have research laboratories within the PVIC home location – the Research and Technology Complex 1 – which boasts 20 kiloWatts of cadmium telluride solar cells in front of the building along Dorr Street. The Department of Physics and Astronomy and SSARE offer

programs to train students at the undergraduate and graduate levels, providing the essential educational component of UT's PV program.

Training the new workforce for this global industry will enable the northwest Ohio region to fill high-tech R&D and manufacturing jobs with Ohioans. Adding Drs. Yan and Podraza demonstrates UT's continued commitment to educate students, address real-world problems in clean energy, and support local industry. "Toledo has long been the place where the rubber meets the road in photovoltaics," according to UT's Prof. Michael Heben. "We're all here to make a difference. It's very hard work, but we're keeping our eyes on the end goals of increasing U.S. energy security, creating new manufacturing strength and jobs for America, and reducing the pollution burden on Earth's water and air to improve the environment in which we all live."

The University's Wright Center for Photovoltaics, www.utoledo.edu/research/pvic/