

MSE-Colloquium@NTU

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New Materials for Solar Power Conversion Applications

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About the Talk

Efficient conversion of solar photons into other forms of energy has become one of the primary objectives of the modern science and technology. In the presentation I will present our work on the development of new materials for specific energy related applications. First I will briefly discuss applications of group III-nitride semiconductor alloys for full solar spectrum, high efficiency multijunction solar cells. The main part of the presentation will focus on advances in using highly mismatched semiconductor alloys for intermediate band solar cells, multicolor light emitters and photoelectrochemical cells. Finally I will present our most recent research on metal oxide based alloys as transparent conductors and discuss potential of using these materials as charge carrier transporting layers in perovskite based solar cells.

About the Speaker

Wladek Walukiewicz graduated from Warsaw University in 1971 with an M.S. in Physics and from the Institute of Physics Polish Academy of Sciences in 1974 with a PhD in Solid State Physics. From 1974 to 1982 he worked for the Institute of Physics. During that time he was a frequent visitor at the Massachusetts Institute of Technology where he conducted studies on electrical and optical properties of compound semiconductors. In 1984 Dr. Walukiewicz joined Lawrence Berkeley Laboratory as a staff scientist. He currently holds a position of senior staff scientist and principal investigator in the Materials Sciences Division. He is also an adjunct Professor in the Department of Materials Science and Engineering at University of California at Berkeley. Dr. Walukiewicz's work covers a broad range of topics in the physics of semiconductors. He has developed models of electronic transport in three- and two-dimensional systems. He has made major contributions to understanding the defect properties of semiconductors. Working with a group of collaborators Dr. Walukiewicz has discovered highly mismatched alloys, a new class of semiconductor materials. In his recent work he has shown that the band gaps of GaInN alloys perfectly match the solar spectrum offering a potential material system for high efficiency, multijunction solar cells. Dr. Walukiewicz has published over 460 papers, review articles and book chapters with a H-index of 63. He is a co-inventor on several patents and patent applications.