

Séminaire

Le mardi 17 novembre 2020, 14h45

Le séminaire se déroulera en anglais.

Seminar

Tuesday, November 17, 2020, 2:45 p.m.

Physical limits for the efficiency of silicon solar panels

Tom Tiedje, University of Victoria

Abstract: The cost of solar electricity depends on the cost and efficiency of solar panels, the vast majority of which are silicon. The record efficiency of silicon photovoltaic devices has been steadily increasing over time and is approaching theoretical limits. This presentation will explain how the physical properties of silicon determine the maximum efficiency (29.5%), and why monofacial devices are more efficient than bifacial devices, which are illuminated on both sides. The efficiency decreases with temperature, favouring operation in a cold climate, and the optimum thickness decreases as the 7th power of the temperature. The optimum thickness for a silicon light harvesting device operating in room light, for the internet of things, is about 2 microns, much less than the optimum for a conventional solar panel. Higher efficiencies can be obtained with more sophisticated approaches to light trapping and better heterojunction contacts and surface passivations.

Bio: A Professional Engineer in British Columbia, a Fellow of the American Physical Society, the Royal Society of Canada and the Canadian Academy of Engineering, Dr. Tom Tiedje is Professor Emeritus of Electrical and Computer Engineering at the University of Victoria. He served as Dean of Engineering, University of Victoria from 2008 to 2018. Before moving to Victoria, he was a faculty member in Physics and Astronomy and Electrical and Computer Engineering at the University of British Columbia, and before that he worked on photovoltaics at Exxon Research and Engineering Company in New Jersey. Dr. Tiedje received his PhD and MSc degrees in Physics from the University of British Columbia and his BSc in Engineering Science from the University of Toronto. His research expertise is in semiconductor materials and photovoltaic devices. In 2016, he received the MBE Innovator Award at the North American Molecular Beam Epitaxy Meeting.

TOP-SET est un programme de formation FONCER du CRSNG en puissance optoélectronique ayant pour but de façonner une cohorte de personnel hautement qualifié détenant des connaissances approfondies en systèmes optoélectroniques pour joindre les rangs d'équipes de recherche et développement.

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