

### Séminaire

Le jeudi 22 mars 2018, 12h15  
De la pizza sera servie dès 11h45  
Premier arrivé, premier servi  
Complexe de recherche avancée, pièce 233  
Université d'Ottawa, 25, rue Templeton  
\*Le séminaire se déroulera en anglais.\*

### Seminar

Thursday, March 22, 2018, 12:15 p.m.  
Pizza to be served starting at 11:45 a.m.  
First come, first served  
Advanced Research Complex, room 233  
University of Ottawa, 25 Templeton Street

## Photovoltaics 4.0: Next-generation renewable energy systems powered by high-efficiency, low-cost photovoltaics

Masakazu Sugiyama, Research Center for Advanced Science and Technology, University of Tokyo

**Abstract:** Photovoltaic (PV) cells have been developed from the 1st generation of crystalline silicon to the 3rd generation of ultra-high-efficiency cells. Recent developments aim at the cells/modules realizing both high-efficiency (>30%) and low-cost, combining ultra-thin-film III-V cells/modules and low-cost processing such as high-speed growth and the reuse of III-V substrates. Fourth generation photovoltaics (PV 4.0) is the system combining such high-efficiency, low-cost modules and high-capacity energy storage/management systems, leading to terawatt-scale PV installations without any burden to electricity grids, enabling us to construct a low-carbon society. PV 4.0 includes two forms of implementation: (1) an independent electricity supply system combining photovoltaic and electricity storage including H<sub>2</sub> based technology, and (2) the storage of PV electricity in a chemical substance and its intercontinental transport from a region with high solar irradiance to another region with large energy demand, a concept of "solar fuel" powered by high-efficiency PV.

**Bio:** Masakazu Sugiyama is Professor at Research Center for Advanced Science and Technology (RCAT), The University of Tokyo. He received the B.E., M.S., and Ph.D. degrees in Chemical Systems Engineering, from the University of Tokyo, Japan, in 1995, 1997, and 2000, respectively. In 2000, he became a Research Associate at the Department of Chemical System Engineering, the University of Tokyo and in 2002, he joined the Department of Electronic Engineering as a Lecturer. He became an Associate Professor in 2005 and was promoted to a full professor in 2016. Dr. Sugiyama's research topics are high-efficiency photovoltaic devices using the nano-epitaxial structures of III-V compound semiconductors and the application to solar-to-chemical energy storage and transport. He is specialized in the epitaxial crystal growth by metalorganic vapor-phase epitaxy (MOVPE). He recently demonstrated high-efficiency hydrogen production using PV and water electrolysis. Dr. Sugiyama has authored and coauthored 245 refereed journal publications and 425 international conference papers.



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 rejoindre les rangs d'équipes de recherche et développement.

NSERC CREATE Training in Optoelectronics for Power: from Science and Engineering to Technology (TOP-SET) is a training program that aims to form a cohort of highly qualified personnel with comprehensive understanding of optoelectronic systems, capable of joining advanced R&D teams.

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