Nova Scotia Energy Research and Development Forum 2012

Rafael Kleiman

Biography

Rafael Kleiman came to the Engineering Physics department at McMaster University in 2003 after working at Bell Labs in Murray Hill, NJ for 11 years. In 2004 he was appointed the Director of the Centre for Emerging Device Technologies (CEDT), the central device fabrication facility on campus. He is the Scientific Director of the NSERC Photovoltaic Innovation Network, bringing together the research community, industry, government, funding agencies and advocacy groups to foster and accelerate the widespread adoption of photovoltaics as a renewable energy resource in Canada. He leads the CFI/ORF $11M project to build the Laboratory for Advanced Photovoltaic Research, focusing on the characterization of next generation photovoltaic materials and devices. As a result of research and development activities through a special project funded by the Ontario Centres of Excellence (OCE) in partnership with ARISE Technologies, his research group holds the world record efficiency for Silicon-based multi-junction solar cells.

Presentation Abstract: Current Status and Future Trends of Solar Cell Technologies

Over the last several years, solar photovoltaic (solar PV) technologies have made significant advances in increasing efficiency and reducing cost. Historically, 1st generation solar cell technologies, based on single crystal silicon, established the market base with moderate efficiency and moderately priced products. Silicon cells and modules still dominate the global market today. Newer 2nd generation technologies, based on a variety of thin-film technologies, achieve lower efficiencies, but at even lower cost, reducing the overall cost/Watt of solar energy production. Finally, 3rd generation technologies seek to achieve both higher efficiencies and lower costs than previous generations. I will present an overview and some key examples of recent innovations in 1st, 2nd and 3rd generation solar cell technologies, their current market positions and respective future outlooks. In the march towards grid parity for solar PV there are additional considerations, such as system-level costs, grid connectivity, storage and competition with legacy and other forms of alternative energy. Finally, I will summarize the current status and future prospects for deployment of solar PV in the Canadian (federal/provincial) context.