

TABLE OF CONTENTS

TECHNICAL BRIEFS	1
• Photovoltaics: Transforming the Electricity Infrastructure of the 21st Century	
UPCOMING TECHNICAL MEETINGS	5
• 2014 IEEE International Electron Devices Meeting (IEDM)	
• 2014 IEEE Semiconductor Interface Specialists Conference (SISC)	
• 2015 IEEE International Symposium on Power Semiconductor Devices and ICs (ISPSD)	
• 2015 IEEE International Reliability Physics Symposium (IRPS)	
SOCIETY NEWS	10
• Message from EDS President-Elect	
• Message from the EDS Vice President of Membership and Services	
• Message from Editor-in Chief	
• Report on the 2014 EDS Region 8 Chapters Meeting	
• EDS VLSI Technology and Circuits Technical Committee Report	
• EDS Membership Fee Subsidy Program	
• EDS Guide to State-of-the-Art Electron Devices	
• Congratulations to the 16 EDS Members Recently Elected to IEEE Senior Member Grade	
• The IEEE Electron Devices Mission Fund of the IEEE Foundation	
• Robert Bosch Micro and Nano Electro Mechanical Systems Award (NEW!)	
• EDS Member and IEEE Life Fellow Named Recipient of 2014 IEEE Medal of Honor	
• EDS Secretary and IEEE Fellow Wins 2014 IEEE Meritorious Achievement Award in Informal Education	
• EDS Member and IEEE Fellow Honored with Boas Medal of the Australian Institute of Physics	
• 2014 PhD Fellowship Winners	
• 2014 EDS Masters Fellowship Winners	
• Call for Nominations: Editor-in-Chief	
YOUNG PROFESSIONALS	22
• Meeting EDS Young Professionals—An Interview with Kyle Montgomery	
• EDS-ETC: Hillsborough High School iSTEM Club	
• New Editions to the EDS Webinar Archive	
• IEEE Journal of Electron Devices (J-EDS)	
• QuestEDS	
CHAPTER NEWS	26
REGIONAL NEWS	29
EDS MEETINGS CALENDAR	36
DON'T MISS THIS SPECIAL EVENT AT THE IEDM! . . .	40

TECHNICAL BRIEFS

PHOTOVOLTAICS: TRANSFORMING THE ELECTRICITY INFRASTRUCTURE OF THE 21ST CENTURY



*Rajendra Singh
Center for Silicon
Nanoelectronics
at Clemson
University*

The 1954 report of 6% efficient silicon solar cells by Chapin and co-workers at the Bell Laboratories [1] led to the use of photovoltaic devices for space applications. Oil embargo leading to the energy crisis of 1973 brought renewed interest in photovoltaics (PV) for terrestrial applications. In 1973, I decided to do my PhD thesis dissertation in the area of silicon solar cells and joined McMaster University as a graduate student in 1974. In the last 40 years, I have witnessed the phenomenal growth of the PV industry. In the energy sector, PV industry has the highest growth rate.

One hour of incident solar energy is equal to all the energy used in one year on our planet. Electricity generation by photovoltaics (PV), is going to revolutionize energy production in a manner similar to the role of computer chips in bringing about the information revolution. From both economic and environmental considerations, PV can provide sustained global economic growth. First objective of this note is to stress the emerging role of photovoltaics for sustainably powering underdeveloped, emerging, and developed economies [2]. The second objective of this note is to point out research directions that will further reduce the cost of PV modules and the electricity generated by PV.

As early as 1980, in a paper on the economic requirements for new materials for solar cells [3] it was predicted - based on the abundance of raw materials—that silicon was the best candidate. Over the last 34 years this prediction has been correct, and it is expected to remain true in the future. Current silicon PV market is slightly more than 90% and in the last few years, the contributions of other PV materials are decreasing. Based on the fundamental understanding

(continued on page 3)

YOUR COMMENTS SOLICITED

Your comments are most welcome. Please write directly to the Editor-in-Chief of the Newsletter at radhakrishnan@ieee.org

YOUNG PROFESSIONALS

MEETING EDS YOUNG PROFESSIONALS

Young Professionals are an important and dynamic part of the Electron Devices Society (EDS). Not only do they represent the future of the society, but in many cases they are its present.



Dr. Kyle Montgomery is a Young Professional who actively collaborates with EDS. He is a researcher and lecturer in the area of compound

semiconductor photovoltaics at the University of California, Davis. His experience as an active member of the society is something to which we hope many other Young Professionals can look forward and, eventually, relate to. He will describe for us how EDS has helped him navigate the earlier stages of his career and formed him as an engineer and scientist.

Q: Kyle, can you please tell us a little about yourself, your background, your career, and your current line of work?

A: Sure thing...I grew up in the big city of Houston, Texas, where I did my undergraduate studies at the University of Houston (BS, 2004). Back in those days, I was still deciding whether to focus on being an engineer or a touring musician/rock star. Obviously, I decided to focus on the former, but I still keep things lively by playing the drums or strumming a ukulele from time to time! After my undergrad, I went to work at Schlumberger, a leading global oilfield service company, where I was tasked with building environmental test systems for passive component characterization. We would conduct electrical endurance tests under a variety of conditions experienced in downhole drilling



including high temperatures, thermal cycling, shock, and vibration. After a few years at Schlumberger, I decided to set aside the steady paycheck for a while and re-enter life as a student, by attending graduate school at Purdue University (MS, 2008; PhD, 2012). During my first semester at Purdue I was introduced to Jerry Woodall, an IEEE Fellow and longtime EDS member, who taught me just about everything I know about compound semiconductor materials and devices. He served as my thesis advisor and has been a great friend and mentor to me for the past seven years. For my PhD, I narrowed in on the area of wide bandgap semiconductors for photovoltaics. These materials have interesting application for high efficiency multijunction solar cells, as well as solar cells used in high temperature environments, such as space missions sending satellites to Mercury or the sun. After graduating, I came to UC Davis to continue research in the area of photovoltaics, but I also support new projects in novel heterojunction bipolar transistors and hybrid solar energy systems. In addition, beginning this year, I work part-time as a lecturer in the Department of Electrical & Computer Engineering.

Q: That sounds like quite a journey, so after all that, how did you become involved in EDS, and what is your current connection with the society?

A: My initial connection to EDS came through my involvement as a graduate student with the IEEE Photovoltaic Specialists Conference (PVSC), which EDS sponsors. I have had the

privilege of serving on the planning committee of the PVSC for the past several years, and, through this, was able to make great connections with several longtime EDS members who got me plugged in to more of what EDS is doing. Since then, I have assisted in different areas, such as helping to establish the EDS Student Mixer at the PVSC, which typically brings in about 150-200 student attendees each year. In addition, I am on the Young Professionals Committee of EDS (since 2013).

Q: So it looks like EDS has been in the center of your professional life. What has the society brought to your career? How has it contributed in shaping it to where it is now?

A: Well, to start, EDS is really the top professional society, in my opinion, for my area of research. They sponsor some of the top journals in the field, including the relatively new *IEEE Journal of Photovoltaics*. And, as mentioned prior, they sponsor key technical conferences such as the PVSC. In this sense, EDS was already shaping my career before I even knew it. However, since becoming a member, I have enjoyed other benefits such as networking with other professionals in EDS, excellent webinars on both technical and non-technical subjects of relevance to my work, and access to scholarships and awards available only to EDS members.

Q: In your opinion, why should a young engineer, like a recent college graduate, join EDS?

A: To me, there are a couple of primary reasons. First, being a member

of a technical society, in general, is important for career development. Not only are there great networking opportunities, but being an EDS member is something that will stay with you regardless of where you work. The fact is that many of us will move around quite a bit during our career, so having a solid grounding through a like-minded technical society is a great way to stay connected. Second, EDS members get free

online access to the EDS journals, which is a great way to stay up-to-date on new research in your area of interest.

Q: Kyle, thank you for your time. Any last remarks for other Young Professionals?

A: I will simply say that if are not already an EDS member...join now! If you are a member, then I encourage you to plug in and get connected with

your local chapter. I guarantee you that many connections you make through EDS will last a lifetime. Cheers!

Contact Kyle at kmontgomery@ucdavis.edu, or find him online at www.kmontgomery.net.

*Daniel Camacho
EDS BoG Member & YP Chair
Intel Corporation
Folsom, CA, USA*

EDS-ETC

Engineers Demonstrating Science:
an Engineer Teacher Connection

HILLSBOROUGH HIGH SCHOOL iSTEM CLUB

The Hillsborough High School iSTEM club was established this year to help students better understand possible career choices in Science, Technology, Engineering, and Math. Several of the students in the club were considering an engineering or related technical career path and wanted to better understand the various engineering disciplines.

Students did research on what different types of engineers actually did on a day to day basis and presented to the club their findings. This included the fields of electrical, mechanical, civil, biomedical as well as the less applied science and math aspects of STEM. Students also drew upon experiences of faculty members who worked as scientists or engineers prior to teaching.

Support provided by the Princeton branch of the IEEE (Institute of Electrical and Electronic Engineers) enabled students to investigate beginning electronic projects using Snap Circuits® kits. Students built several functioning circuits (including AM and FM radio, signal generators, and LED timers). After working

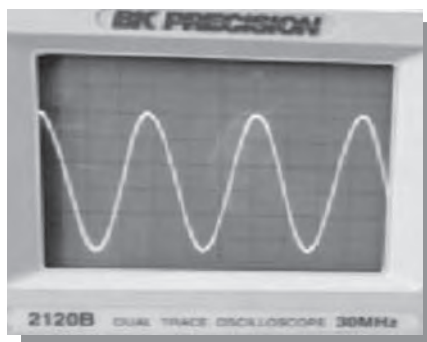


Fig. 1 (Incoming AC signal)



Fig. 2 (rectified AC signal)



Fig. 3 (Hillsborough High School students presenting their poster at the 2014 ISEC conference)