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Topic: Overview of Wireless Power Transmission with Microwaves

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IEEE-EDS Dallas Section - University of Texas at Arlington - NanoFab

Fall 2008 DISTINGUISHED SPEAKER SERIES
MICRO & NANO-SYSTEMS

IEEE Dallas Section: Direction

November 2008

Volume 52, Number 3

From the Chair

By Robert Shapiro

Hello IEEE Dallas Section Colleagues,

As we move into November, and voting is in the air, it is time to select the IEEE Dallas Section leaders for 2009.

As listed in the IEEE bi-laws (and as followed through by the IEEE Dallas Section) the Past Chair selects the slate of officers for the next year with the recommendations from a Nominations and Elections Committee - which in Dallas is traditionally the current officers.

This year the Past Chair is Dr. Gerald Burnham and he approves the following slate of officers for 2009:

Past Chair: Bob Shapiro
Chair: Larry Zhang
Vice Chair: Dinesh Rajan
Administrative Chair: Liming Xiu
Secretary: Steve Simmons
Treasurer: Mark Swenholt

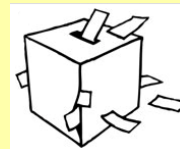
Non Voting
Pace Chair: Maura Shreier Fleming
GOLD Chair: Mohit Malhan
University Relations: Will Lumpkins

Open Non Voting Positions:
 Membership Development
 Industry Relations

If there are no objections from the members within 1 month from the posting of the list then the officers will be approved via general consent and start to serve their term on January 1, 2009.

Please let me know if you have any questions or concerns. Have a great month and please try to attend as many local meetings as possible.

Best regards,
 Bob Shapiro
 IEEE Dallas Section
 2008 General Chair
bshapiro@ieee.org



Joint meeting between IEEE Dallas Section and IEEE Consultants network

Topic: CONQUER PROCRASTINATION: Tools for Personal Productivity

Date: Monday, November 10, 2008

Time: Social/Networking/Dinner 6:15 pm Program 6:45 pm

Location: Holiday Inn Select, 1655 North Central Expressway, Richardson, TX (South of Campbell Road, west side of Central)

Speaker: Mina Brown, President, Positive Coaching Group

Cover: \$5 for IEEE Members, \$15 for non-IEEE Members/Guests (includes light supper buffet) IEEE members who RSVP may bring a guest at no additional charge.

RSVP: http://ieeetmc.com/r5/dallas/registration/nov_meeting/



Executive Committee

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Dallas Section
Chapter Meetings/Events

The University of Texas at Arlington - College of Engineering

NANOFAB



IEEE-EDS Dallas Section · University of Texas at Arlington - NanoFab
Fall 2008 DISTINGUISHED SPEAKER SERIES
MICRO & NANO-SYSTEMS
3:30pm – 4:45pm, Nedderman Hall, Room 105



November 11
Materials Science at the Nanometer Scale in High-k Oxides Technology for Silicon CMOS

Supratik Guha, Ph.D., Senior Manager, Semiconductor Materials and Devices, IBM Thomas J. Watson Research Center



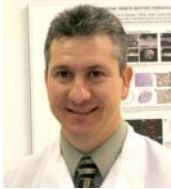
November 18
Fuel-powered and Electrically-powered Artificial Muscles Using Carbon Nanotubes and Shape Memory Alloys

Ray Baughman, Professor of Chemistry, Director of the NanoTech Institute, UT Dallas



November 20
Self-Assembled Nanodevices and Nanosensors

Agis A. Iliadis, Professor of Electrical & Computer Engineering, Director of Semiconductor Nanotechnology Research Laboratory University of Maryland at College Park



November 25
Nano and Bio Contributions To Advanced Neurointerfacing
Mario Romero-Ortega, Associate Professor of Bioengineering, Laboratory of Regenerative Neurobiology, UT Arlington

RSVP to Thanh Bui at tbui@uta.edu or 817-272-1536.

This series is in conjunction with EE 5344 – Introduction to MEMS, which is offered by UT Arlington. Information about this course and microsensor activities at UT Arlington can be obtained from Professor Z. Celik-Butler at zbutler@uta.edu.



IEEE-EDS Dallas Section · University of Texas at Arlington - NanoFab
Distinguished Lecture Series in Nano & Micro-Systems

November 11: Materials Science at the Nanometer Scale in High-k Oxides Technology for Silicon CMOS

Speaker: **Supratik Guha, Ph.D.**
*Senior Manager,
Semiconductor Materials and Devices
Physical Sciences Department
IBM Thomas J. Watson Research Center*

One expects that when dissimilar materials such as ionic oxides, metals and semiconductors are stacked together with thicknesses that may be traversed by a few tens of atomic jumps or less, there can be significant amounts of material inter-diffusion and reaction. This is indeed the case for the high-k metal gate structures that are replacing the time-tested SiO₂/polysilicon transistors in silicon CMOS technology. It is also not difficult to imagine that small changes in the physical stack can have significant desirable or undesirable effects upon the electrical performance of the devices. In this presentation, Dr. Guha will review our understanding of some of these materials phenomena uncovered in the passage of almost a decade of “high-k” research and carried out to the beat of clear technology and device goals. He will also describe some of the materials work leading to the critical role of oxygen vacancies in these stacks, and the stability of the oxide-semiconductor interface – issues that are generic to many ionic oxide-semiconductor heterostructures.

Supratik Guha has been at IBM Research since 1995. He is one of the early members of IBM’s high-k research group; he has led IBM’s high-k materials research program over the past decade and was responsible for some of the key materials advances that led to IBM’s first high-k metal gate technology. More recently, he has been driving IBM’s research strategy in photovoltaics and responsible for setting up active research programs in concentrator photovoltaics (PV), solution processed thin film PV, and nanostructured PV.

Dr. Guha’s received his Ph.D. in Materials Science from the University of Southern California in 1991 and a B. Tech in Metallurgical Engineering from the Indian Institute of Technology, Kharagpur, in 1985. His research interests are in the areas of new semiconductors and oxides for electronic and energy conversion applications. He is the author of more than 90 publications and has 27 patents. From 1992-95, he worked at the 3M Corporate Research Labs in the II-VI semiconductor laser group. He is also currently an adjunct professor of materials science at Columbia University.

November 18 : Fuel-powered and Electrically-powered Artificial Muscles Using Carbon Nanotubes and Shape Memory Alloys

Speaker: **Dr. Ray Baughman**
*Professor of Chemistry
Director of NanoTech Institute
University of Texas at Dallas*

Humankind has had little success in replicating the wondrous properties of natural muscle, which has meant that the most advanced prosthetic limbs, exoskeletons and humanoid robots lack critically needed capabilities. The use of electrical input power, instead of nature’s choice of high energy density fuel, is a problem for autonomous operation, severely limiting operational lifetime between recharges. Another problem is the inability to place sufficient motors into available space to provide natural movement. In this presentation, Dr. Baughman will describe a host of chemically-powered and electrically-powered artificial muscles that use actuator strokes generated by either carbon nanotubes or shape memory materials. The newest of these carbon nanotube artificial muscles provides more than 3X actuator stroke, a stroke rate of over a 10⁴ %/second, and operates from near 0o K to far above the demonstrated 1900o K.

Ray Baughman became the Robert A. Welch Professor of Chemistry and Director of NanoTech Institute at UT Dallas in August 2001, after 31 years

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in industry. He is a Member of The National Academy of Engineering and the Academy of Medicine, Engineering and Science of Texas; a Fellow of the American Physical Society; an Academician of The Russian Academy of Natural Sciences; an Honorary Professor of three universities in China; and is on editorial and advisory boards of *Science*, the *International Journal of Nanoscience*, and the *Encyclopedia of Nanoscience and Nanotechnology*.

Dr. Baughman has 58 US patents and over 290 publications with over 11,500 citations. He has received the Chemical Pioneer Award from the American Institute of Chemists (1995), the Cooperative Research Award in Polymer Science and Engineering (1996), the New Materials Innovation Prize of the Avantex International Forum for Innovative Textiles (2005), Nano 50 Awards from *Nanotech Briefs Magazine* for Carbon Nanotube Sheets and Yarns (2006) and for Fuel Powered Artificial Muscles (2007), the NanoVic Prize from Australia (2006), the *Scientific American Magazine 50* recognition for outstanding technological leadership (2006), the CSIRO Metal for Research Achievement (2006), Chancellor's Entrepreneurship and Invention Award (2007), 21 for the 21st Century award (2007), the Alumni Distinguished Achievement Award of Carnegie Mellon University (2007) and the Kapitza Metal of the Russian Academy of Natural Sciences (2007).

November 20 : Self-Assembled Nanodevices and Nanosensors

Speaker: **Professor Agis A. Iliadis**
Professor of Electrical & Computer Engineering
Director of Semiconductor Nanotechnology Research Lab
University of Maryland at College Park

Dr. Iliadis will describe the development of self-assembled ZnO nanostructures through diblock copolymer synthesis on large-area Si(100) wafers and device applications. His studies of the structural characteristics exhibited by the self-assembled ZnO nanostructures have shown that the nanostructures are formed on the Si surface in a pseudo-epitaxial way following the substrate orientation at room temperature while their size and density is shown to be controlled by the styrene-acrylic acid-[PS]_m/[PAA]_n copolymer block ratios m and n (Fig. 1. a and b).

Fig.1. (a) 2-D and 3-D AFM images of ZnO nanoparticles for [PS]₁₅₉/[PAA]₆₃, with m/n=159/63. Lateral size distribution 250-350nm, density of 3.5x10⁷cm⁻². **(b)** AFM images for m/n=106/17. Size (40-140nm), density of 1.0x10¹⁰cm⁻².

This large area nanostructure delivery process on Si surfaces allows the nanostructures to form intimate interfaces for nanodevice operation and is compatible with CMOS processing technology and it enables the monolithic integration of nano-devices with CMOS technology to enhance CMOS functionality in bio, gas sensing, and optical (UV) emission-detection capabilities.

Agis A. Iliadis received his M.Sc. and Ph.D. degrees in Electrical Engineering from the University of Manchester Institute of Science and Technology. His expertise is in the areas of semiconductor nanotechnology, nanodevices, nanosensors, circuits and CMOS IC technology. He is a senior member of the IEEE, a Distinguished Lecturer in the IEEE-EDS Society, an AdCom member of the IEEE EDS Educational Activities Committee, and has served as the EDS Representative to IEEE-USA Professional Activities Board (PACE). He is also a member of MRS, LEOS, InstPhys (UK), SPIE, TMS, DEPS and ECS, and organized and served in several conference committees.

November 25: Nano and Bio Contributions to Advanced Neurointerfacing

Speaker: **Professor Mario Romero-Ortega**
Associate Professor of Bioengineering

Laboratory of Regenerative Neurobiology

University of Texas Arlington

Interfacing advanced robotic prosthetic devices with the nervous system of amputees offers the possibilities of functionally replacing their missing limbs and enabling them to naturally control and feel a bionic substitute. Professor Romero-Ortega and his associates have developed a biosynthetic nerve implant for the repair of gap injuries, allowing the guided regeneration of transected peripheral axons, and have designed a novel neuro-electrical interface for peripheral nerves with modifications that aimed at allowing for neuron type-specific recording/stimulation. These have the potential of providing a higher and more natural motor control over robotic prosthetic limbs via specific sensory feedback. His team is currently investigating regenerative strategies whereby nociceptive, proprioceptive and motor axons can be segregated through specific neurotrophin induction. Their research also includes improving the bio-abio interface – a critical limiting step in the functional half-life of implantable neural electrodes. Recently, they demonstrated that carbon nanotubes, due to their high-aspect ratio and ballistic conductive capabilities, not only improve long-term neural interfacing, but also significantly increase the recording sensitivity and reduce the energy needed for nerve stimulation.

Dr. Romero-Ortega received a bachelor's degree in Biology from the Univ. of Guadalajara, Mexico in 1991 and a doctoral degree in Neuroscience from Tulane University in 1997. In 2002, he joined the Neurology faculty at UT Southwestern as assistant professor and later became the Assistant Director of Research in the Plastic Surgery Department at UTSW. He subsequently became the Director of the Regenerative Neurobiology Research Division at the Scottish Rite Hospital for Children. Dr. Romero-Ortega joined UT Arlington in 2008. His research is in the general area of nerve injury and repair, with a long-term goal of contributing to the understanding of the molecular basis that regulates neurite growth, axon guidance and target recognition, and to the design of regenerative strategies with clinical application.

Dr. Romero-Ortega's work has been published in 24 peer reviewed publications. He is member of the International Association of Nanotechnology, the Tissue Engineering Society International, the Society for Neuroscience, and a past associate member of the Christopher Reeve Paralysis Foundation Research Consortium on Spinal Cord Injury. Dr. Romero-Ortega serves as a member of the advisory board of NanoTX08, the associate editor of *Frontiers in Neuroengineering* and an ad hoc reviewer for several scientific publications.

Consultants Network (CN)

Topic: CONQUER PROCRASTINATION: Tools for Personal Productivity

Date: Monday, November 10, 2008

Time: Social/Networking/Dinner 6:15 pm Program 6:45 pm.

Location: Holiday Inn Select, 1655 North Central Expressway, Richardson, TX
(South of Campbell Road, west side of Central)

Speaker: Mina Brown, President, Positive Coaching Group

Cover: \$5 for IEEE Members, \$15 for non-IEEE Members/Guests (includes light supper buffet) IEEE members who RSVP may bring a guest at no additional charge.

RSVP: http://ieeetmc.com/r5/dallas/registration/nov_meeting/

Abstract: There will NEVER be enough time to do everything that we need or want to do. So, naturally there some things that you procrastinate

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on, right? Unfortunately, procrastination can produce stress, reduce quality, lower self esteem and even injure credibility. This seminar will help you understand why we procrastinate and what we can do about it.

Objectives:

- Understand what underlying factors cause us to procrastinate
- Explore a variety of tools and processes for managing your time, your priorities, and your life
- Create a system that works for you and reclaim your productivity to become more successful

Speaker Bio: Mina Brown has been an executive coach, leadership consultant, and entrepreneur for over twelve years. As a former senior executive and CFO, she offers the powerful combination of successful business leadership experience coupled with intuition and unflinching candor. She primarily works with senior executives, executive teams, and professionals in large global companies such as Microsoft, Dell, HP, Nissan, Ferrosan, and Unisys. Prior to forming Positive Coaching Group, Mina was CFO of Aviall and SVP & General Manager of its Aerospace Division. Earlier, she held executive positions with Ryder System and Amax. She began her career with Price Waterhouse. Mina holds an MBA from Vanderbilt University, BBA from Eastern Kentucky University, and a CPA. She is a Certified NLP Coach (NLPC), a member of ICF and founding member of CoachVille and IAC. Mina's new book, BE SHARP: The Definitive Guide to Powerful Introductions and Professional Bios, will be available in December.

Consumer Electronics Society (CES)

Topic: Virtual Embedded Advertising in Sport Productions

Date: Tuesday, November 11th, 2008

Time: Lunch/Chapter business: 11:30 AM - 11:45 P.M.
Program: 11:45 - 12:45 P.M.

Location: Holiday Inn Select, Richardson
1655 N. Central Expressway (US 75),
(Southbound frontage road, south of Campbell)
Richardson, TX 75080

Speaker: Kenneth J. Overton, Ph.D., President, CTO, Founder,
Vistas Unlimited, Inc.

Abstract: Vistas is a small, privately-held, technology company headquartered in Plano focused on developing and bringing to market virtual insertion technology. The Vistas MVP is a real-time graphics special effects systems used (primarily) for live TV sports production. The system inserts content into a live broadcast feed so that the inserted material appears to exist in the venue including handling camera motion and occluding objects. In practice, the system has application in two primary markets: game enhancement and virtual advertising. The Emmy award-winning AimPoint seen during Golf Channel L/PGA coverage is an example the system used for game enhancement. Floor signage seen on the court during Texas Tech Men's Basketball games is an example of virtual advertising. This talk will present the Company and discuss the technology, applications, and market for the Vistas system. Example applications in various sports will be presented.

Speaker Bio: Dr. Overton holds a Bachelor's degree in Physics and Computer Science from Indiana University, and MS and Ph.D. degrees in Computer and Information Science from the University of Massachusetts with postgraduate work focused on robotic sensing systems. He began his career in industry spending over 10 years in

the corporate research labs at DEC and GE. This work was followed by more than 20 years of senior executive experience leading and managing large technology development and commercialization efforts at companies such as E-Systems (now part of Raytheon) and General Electric. In 1999, Dr. Overton formed a team to develop his concept for real-time virtual insertion. The company, Mirage Systems, had substantial expertise not only in the core technologies employed in the MVP but also in television sports production, distribution, and advertising. Mirage Systems was superseded in 2002 by Vistas Unlimited. Dr. Overton holds 12 U.S. and international patents, has authored 20 papers, and was co-winner of the 2007 George Wensel Technical Achievement Emmy.

For additional information, please contact Sue Hui at (214)567-5017, shui@ti.com or visit our website: <http://www.dallasces.org/>

Computational Intelligence (CI)

Topic: November Social Lunch

Date: November 18th 2008

Time: 11:30 am to 1:00 pm

Location: On the Border Mexican Grill & Cantina. 4855 Belt Line Road. Addison, TX 75001

Cover: Lunch from \$10 up

Contact: Contact Orlando DeJesus Phone: 972-418-3078, e-mail: Orlando.dejesus@halliburton.com

Description: We will discuss future plans, 2009 officer's election and define general direction of the chapter.

Electromagnetic Compatibility (EMC)

Topic: P25 Land Mobile Radio Testing Program

Date: Tuesday, Nov. 18, 2008

Time: 6:00 PM Program 7:00 PM

Location: Intertek
420 N Dorothy Dr
Richardson, TX 75081

Speaker: Kurt B. Fischer; P25 CAP Laboratory Program Manager
Office of Law Enforcement Standards (OLES) NIST

RSVP: to Joe Stanfield, joe@swelectronic.com

Abstract/Summary: The Project 25 Compliance Assessment Program (P25 CAP) is a voluntary program that allows P25 equipment suppliers to formally demonstrate their products' compliance with a select group of requirements. The purpose of the program is to provide emergency response agencies with evidence that the communications equipment they are purchasing meets P25 standards for performance, conformance, and interoperability. The P25 CAP will provide the more than 60,000 emergency response agencies nationwide with a consistent and traceable way to be sure that the products they buy are P25 compliant. It will also provide a means of verifying that Federal grant dollars are being invested in standardized solutions and equipment that promote interoperability.

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Speaker Bio: Kurt Fischer joined NIST in the Office of Law Enforcement Standards (OLES) in 2008. Kurt is the P25 CAP Laboratory Program Manager. Kurt has worked and managed EMC and communications laboratories. He has been an assessor of test laboratories and Certification Bodies (e.g.) TCB for ANSI, A2LA, NVLAP, and NIST. Kurt is a NARTE Certified EMC Engineer, a Senior Member of the IEEE, and a member of the IEEE EMC and Communications Societies. Kurt is Chairman of ANSI Accredited Standards Committee C63® - EMC Subcommittee 6 on Accreditation and Conformity Assessment.

Website URL: <http://dallasemc.org/>

Microwave Theory and Techniques (MTT)

Topic: Overview of Wireless Power Transmission with Microwaves

Date: Tuesday, November 25, 2008

Time: Lunch 11:30 AM / Program 12:00 noon

Location: Shuiwah Chinese Buffet
400 N Greenville Ave #11
Richardson, TX 75081
(972) 907-8868

Speaker: James O. McSpadden, Ph.D.

Cover: Mandatory \$5 (\$10 for non-IEEE members) includes admission and buffet. No charge for Student and Life Members.

RSVP: Please RSVP to csanabria@tqs.com by noon, November 21st, for restaurant headcount.

Abstract: Power transmission through the air by microwaves has a long history of technology development and demonstrations. Since the 1960s, key technology developments in component conversion efficiencies (DC-to-RF and RF-DC) increased the end-to-end system efficiency. By 1975, the system efficiency increased from 15% to 54% at 2.45 GHz. These early wireless power transmission demonstrations proved this concept as a viable form of power transmission to ground, air, and space platforms. Whereas they emphasized high power, low frequency, and long distance power beaming, recent applications have developed over relatively shorter distances and lower power over a wide range of frequencies. These applications include powering personal electronics and unmanned aerial vehicles along with extracting energy from radiated RF from broadcast communication towers. WPT technology development and demonstrations have occurred at higher frequencies up to 60 GHz. In all applications, high transmitter and rectenna efficiencies are required to decrease the dissipated heat. High power, high efficiency solid-state amplifiers have been developed to allow phased array antenna transmitters to electronically steer the power beam to single or multiple rectennas. Thin and lightweight rectennas have been developed that are efficient, polarization agile, and conformable to a platform's structure. Along with these topics, the history, key demonstrations, WPT concepts, applications, and technology updates are discussed.

Speaker Bio:

James McSpadden, Ph.D., is a Principal Electrical Engineer at Raytheon whose main job functions include the design and development of microwave components, phased array modules, and satellite communication systems. He has been involved with microwave power transmission technology for over 18 years as a researcher at The Boeing Company and Raytheon and as a private consultant. While

at Boeing, he was the Principal Investigator for a contract in the NASA Space Solar Power program whose purpose was to define a concept for a 5.8 GHz, solid-state, power transmitter for a GEO-based satellite. In 2002 he created his private consulting company to design, build and test rectenna arrays and to perform system analyses on WPT applications.

He has written 20 papers and reports on microwave power transmission technologies and applications. Dr. McSpadden holds the 5.8 GHz efficiency record for a rectenna element at 82%. Currently, he is writing a technology book entitled "Microwave Power Transmission."

Sponsorship:

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<http://technopatents.com>

Phone 1-972-980-5838

More information at the MTT website:

<http://ewh.ieee.org/r5/dallas/mtt/>

Dallas Section

Chapter Information

Aerospace and Electronic Systems (AES)

Website: <http://ewh.ieee.org/r5/dallas/aes/index.html>

Chapter Chair: Tim D. Reichard (972) 380-6605
Tim_D_Reichard@raytheon.com

Program Chair: Jared Ellington (214) 654-5660

Secretary / Treasurer: Mark Gober (972) 205-4752
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Antennas and Propagation (AP)

Website: <http://www.ieeedallas-aps.org/>

Chair: Mr Narindra Nath Lakhanpal (972) 387-9243
narindra_lakhanpal@hotmail.com

Circuits and Systems (CAS)

Website: <http://ewh.ieee.org/soc/cas/dallas/>

General chair: Sudhind Dhamankar
sudhind@ti.com

Vice chair: Luke Wu

Publicity Chair/Secretary: Mak Kulkarni

Technical program chair: Bogdan Staszewski

Meeting chair: Arjun Rajagopal

Treasurer: Saqib Malik

Member Chair: Tuna B Tarim

Communications & Technology (CVT)

Website: <http://www.cvt-dallas.org/>

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Computational Intelligence (CI)

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Computer (C)

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Secretary: Bill Pervin
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Program Chair: Jim Bondi

Web Chair: Jim Bondi

Consultants Network (CN)

Website: <http://www.ieeedallascn.org/>

Chair: Neil Kaden
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Consumer Electronics Society (CES)

Website: <http://www.dallasces.org/>

Chair: Sue Hui (214) 567-5017
suehui2000@yahoo.com

Vice Chair: Mike Hannah (214) 480-1087
m-hannah@ti.com

Treasurer: Anuradha Sundararajan (214) 293 2537
sanuradha@ti.com

Secretary: Adolfo Echeverria (972) 742-7579
adolfo@ti.com

Education (E)

Past Chair William M. Riley (214) 478-4065
bill@billrileys.com

If you are interested in volunteering/becoming an officer for this society, please contact the past chair, William Riley.

Electromagnetic Compatibility (EMC)

Website: <http://www.dallasemc.org/>

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Electron Devices (ED)

Chair Zeynep Celik-Butler (817) 272-1309
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Engineering in Medicine and Biology (EMBS)

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Secretary/Treasurer: Harry F Tibbals, UTSW

Program Chair: Roy Chaney, UTD

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Chair: Bob Bishop (903) 482-5320
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Laser & Electro-Optics (LEO)

Website: <http://enr.smu.edu/leos/>

Chair Reddy N. Urimindi (972) 523-3029
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Microwave Theory and Techniques (MTT)

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Treasurer: Weimin Peng

Secretary: Chris Sanabria
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Program Chair: Jim Carrol
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Program Chair: Hank Largey
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Power Engineering (PE)

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Secretary/Treasurer : George Luke
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Power Electronics (PELS)

Website: <http://www.Dallaspels.org>

Chair: Don Marabell (469) 330-9100 x230
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Vice Chair: Aaron Xu

Treasurer: Zao Yang

Secretary: Brent Markham

Dallas Section Chapter Information

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Signal Processing (SP):

Website: <http://www.utdallas.edu/~kehtar/ieee-sp>

Chair Nasser Kehtarnavaz (972) 883-6838
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Solid-State Circuit (SSC):

Chair: Gonggui Xu 214-680-6688
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Vice Chair: Tan Du
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Treasurer: Weibiao Zhang
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Program Chair: Ping Gui
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Meeting Chair: Huawin Jin
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Secretary: Sachit Garg
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Technology Management Council Officers:

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Vice Chair: Mr Paul Lakhanpal
narindra_lakhanpal@hotmail.com

Secretary/Treasureer: Mr Mohit S. Malhan (214) 356-5714
mohit.05@gmail.com

Life Member Group Officers:

Chair: Mr Narindra Nath Lakhanpal (972) 387-9243
narindra_lakhanpal@hotmail.com

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