



# Material matters

Newsletter of the Materials Science and Engineering Department

Fall 2005

## Department highlights

- **8 Faculty (Ceramics, metals, polymers, composites, electronic materials, nanomaterials, biomaterials, tribology)**
- **1 Faculty to start Spring 2006**
- **Search underway for 1-2 additional faculty**
- **Many adjunct and affiliate faculty**
- **20 PhD and 12 MS students**

## Current Funding

- **NSF-GOALI**
- **NSF-REU**
- **NASA**
- **NIST**
- **TATP**

## INSIDE THIS ISSUE

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## Chair's Message

Michael Kaufman



This long overdue issue of our newsletter comes after a time of many transitions in the department. The department joined the new College of Engineering in 2003 and moved to the Research Park (a former Texas Instruments facility) 4

miles north of the main campus here in Denton, Texas. Simultaneous with the arrival of the new dean to lead the college, Professors Gnade (department chair), Wallace and Kim were attracted as a cluster hire to the University of Texas at Dallas leaving behind a huge gap in the department. I was hired to replace Dr. Gnade as chair having spent the previous fifteen years in various capacities on the faculty at the University of Florida.

Upon arriving on campus in early 2004, my first task was to conduct a search for two new faculty members to replace the vacancies left by the departure of Professors Wallace and Kim. Fortunately, we were successful in attracting Dr. Rajarshi Banerjee from the Ohio State University and Dr. Brian Gorman who was working as a post-doc at UNT after receiving his PhD from the University of Missouri in Rolla.

This year, we conducted a second faculty search and were successful in attracting Dr. Thomas Scharf from Sandia National Laboratories in Albuquerque, NM and Dr. Nigel Shepherd from the Army Research Laboratory in Adelphia, MD. Tom is a graduate of the University of *(continued on page 8)*



**Michael Kaufman – Chair**

- ❖ Structural metals and alloys
- ❖ Bulk metallic glasses
- ❖ Shape memory alloys
- ❖ Advanced characterization

**Current Research Areas:**

**Advanced Metallics Laboratory**

- ❖ Strain measurements using convergent beam electron diffraction,
- ❖ High temperature shape memory alloys,
- ❖ Interstitial effects in bulk metallic glasses.
- ❖ Mn effects in cast Al alloys
- ❖ Metal and intermetallic matrix composites



**Rajarshi Banerjee**

- ❖ Processing & characterization of metallic thin films.
- ❖ Laser engineering net shape processing.
- ❖ Biomaterials

**Current Research Areas:**

**Advanced Metallics Laboratory**

- ❖ Sputtering of multilayer thin films
- ❖ Laser engineering net shape manufacturing of structural materials (Ti-B composites) and prosthetics
- ❖ Nanotube reinforced composites



**Witold Brostow**

- ❖ Polymer and composite systems
- ❖ Materials Science education.

**Current Research Areas:**

**Laboratory of Advanced Polymers & Optimized Materials (LAPOM)**

- ❖ Development of materials with improved mechanical, tribological and thermophysical properties, including thermoplastics, thermosets, polymer-based composites and coatings.



**Mohamed El Bouanani**

- ❖ Electronic thin film Materials: Growth, processing and Characterization
- ❖ Advanced Ion Beam Analysis methods, X-ray Photoelectron Spectroscopy

**Current Research Areas:**

**Laboratory for Electronic Materials and Devices**

- ❖ Hydrogen and Impurity Defects in High-k Dielectrics, Advanced Electrode Materials and workfunction tuning, Metallization and Diffusion Barriers.



**Nandika D'Souza**

- ❖ Packaging films and substrates
- ❖ Mechanical behavior and life prediction in polymers and composites.
- ❖ Nanotube-reinforced epoxy

**Current Research Areas:**

**Mechanical Testing and Rheology Laboratory**

- ❖ Hybrid organic-inorganic polymer nanocomposites using nanotubes and nanoclays; Mechanical interrelationships between strain rate, temp., and deformation.



**Brian Gorman**

- ❖ Ceramics processing
- ❖ Analytical and high resolution electron microscopy
- ❖ Solid oxide fuel cells

**Current Research Areas:**

**Energy Related Materials**

- ❖ Thin film solid oxide fuel cell development, photonic structures in wide-gap semiconductors for biosensing, processing inorganic thin films on polymeric substrates for photovoltaics & flexible displays.



**Richard Reidy**

- ❖ Supercritical processing
- ❖ Ultra-low k dielectrics
- ❖ Synthesis and processing of novel ceramics.

**Current Research Areas:**

**Materials Synthesis & Processing Laboratory**

- ❖ Aerogels, xerogels, and other novel ceramics for semiconductor, dielectric, energy, and sensor applications. Low K xerogel films, biomaterial growth templates, and antibacterial coatings.



**Thomas Scharf**

- ❖ Physical & Chemical Vapor Deposition of ceramic & metallic thin films
- ❖ Micro- & Nano-Tribology of solid lubricants
- ❖ MEMS materials and tribology

**Current Research Areas:**

**Materials Processing and Tribology**

- ❖ Solid Lubricants for Rolling Element Bearings
- ❖ In-situ Chemical Diagnostic Tribology
- ❖ Atomic Layer Deposition of Nanocomposites and Nanolaminates

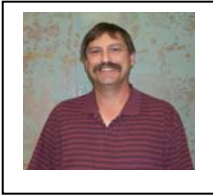
## Materials Science Staff



Alberta Caswell  
Administrative  
Assistant



Alaina Bailey & Celi Ramos  
Student Assistants



David Garrett  
Electron  
Microscope  
Technician



John Sawyer  
Electronics Tech. /  
Safety Officer



Craig Collins  
Lab Technician

## Scholarships Awarded

**Graduate Doctoral Fellowship  
(\$20,000)  
Maia Romanes**

**Graduate tuition scholarship  
(\$5000)  
Casey Smith  
Mithun Kamath  
Selina Akhter  
Ashish Srivastava**

**Department competitive tuition scholarship  
(\$1000)  
Chih-Ming "Jimmy" Chen  
Zhengtao Yang  
Sonia Samuel  
Parag Ganpule**

**All students pay in-state resident tuition with  
a scholarship.**

## The Materials Research Society University of North Texas Chapter announces its officer roster for 2005-2006

**President: Vaishali Ukirde  
Vice President: Laxmi Sahu  
Secretary: Ali Shaito  
Joint-Secretary: Suman Vadlakonda  
Treasurer: Chiranjeevi Vamala**

**Planned activities available to students doing  
research in materials**

### Fall 2005

- **Fall potluck**
- **Setup volleyball and table tennis**
- **Organize resumé writing workshop**
- **Make T'shirt with advertising spots for raising funds**

## SPE

**The University of North Texas Student  
Chapter of the Society of Plastics  
Engineers announces its  
officer roster for 2005-2006**

**President : Oscar Olea-Mejia  
Vice-president : Ali Shaito  
Secretary : Laxmi Sahu  
Treasurer : Jay Unni**

### Highlights

- **South Texas SPE sponsored ANTEC – Boston Trip**
- **Engaged with TAMS Students for active undergraduate – graduate partnerships.**

**Alumni M.S.**  
**(Since our last Newsletter)**

**Fall 2003**

-Nidhi Singh  
Materials Science & Engineering  
Advisor: B. Gnade

**Spring 2004**

-Fadziso Mabel Mantiziba  
Materials Science & Engineering  
Advisor: B. Gnade

-Tao Zheng  
Materials Science & Engineering  
Thesis: Study of Conductance Quantization by Cross-Wire Junction  
Advisor: B. Gnade

**Summer 2004**

-Robert William Brown  
Materials Science & Engineering  
Thesis: Development of a Novel Grease Resistant Functional  
Coating for Paper-Based Packaging and Assessment of Application  
by Flexographic Press  
Advisor: W. Brostow

-Kevin Michael Chapla  
Materials Science & Engineering  
Advisor: B. Gnade

-Gowrisankar Damarla  
Materials Science & Engineering  
Thesis: Investigation of Growth Kinetics of Self-Assembling  
Monolayers by Means of Contact Angle, Optical Ellipsometry,  
Angle-Resolved XPS and IR Spectroscopy.  
Advisor: W. Brostow

-Poonam Kadam  
Materials Science & Engineering  
Advisor: R. Reidy

**Summer 2005**

-Siddhi Pendse  
Materials Science & Engineering  
Thesis: Effect of Nanoclay on the Morphological Properties of Poly  
(Ethylene Terephthalate in Relation to Fracture Toughness.  
Advisor: N. D'Souza

**Spring 2005**

-William Carl Strauss  
Materials Science & Engineering  
Thesis: Saturation and Foaming of Thermoplastic Nanocomposites  
using Supercritical CO<sub>2</sub>  
Advisor: N. D'Souza

-Zhengtao Yang  
Materials Science & Engineering  
Thesis: A Magnetorheological Study of Single-Walled and Multi-  
Walled Carbon Nanotube Dispersions in Mineral Oil and Epoxy  
Resin  
Advisor: N. D'Souza

**Alumni PhD**  
**(Since our last Newsletter)**

**Fall 2003**

-Bryan Wayne Bilyeu  
Materials Science & Engineering  
Dissertation: Characterization of Cure Kinetics and Physical  
Properties of a High Performance, Glass Fiber-Reinforced Epoxy  
Prepreg and a Novel Fluorine-Modified, Amine-Cured  
Commercial Epoxy.  
Advisor: W. Brostow

-Ricardo Simoes  
Materials Science & Engineering  
Title: Mechanical behavior and performance of injection molded  
semi-crystalline polymers  
Advisor: W. Brostow

-Ajit Ranade  
Materials Science & Engineering  
Title: Barrier and long term creep properties of polymer  
nanocomposites  
Advisor: N. D'Souza

**Spring 2004**

-Zhengping Zhang  
Materials Science & Engineering  
Dissertation: Hydrophobic, Fluorinated Silica Xerogel for Low-k  
Applications  
Advisor: R. Reidy

**Spring 2005**

-Peter Robert Butzloff  
Materials Science & Engineering  
Dissertation: Charge Interaction Effects in Epoxy with Cation  
Exchanged Montmorillonite Clay and Carbon Nanotubes  
Advisor: N. D'Souza

-Rosa Amelia Orozco-Teran  
Materials Science & Engineering  
Dissertation: Functionalization and Characterization of Porous  
Low -K Dielectrics  
Advisor: R. Reidy

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*Industrial Advisory Board*

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- Ali E. Akinay - Alcon Laboratories, Inc.
- Donald Bray - POCO Graphite
- Syed Hamid - Halliburton
- David Hunn - Lockheed Martin
- J.D. Luttmer - Texas Instruments
- Jerry Nanni - Bell Helicopter
- Thomas Ruglic - Bodycote
- Jeff Sharp - Marlow Industries
- Steve Wisner - Retractable Technologies, Inc

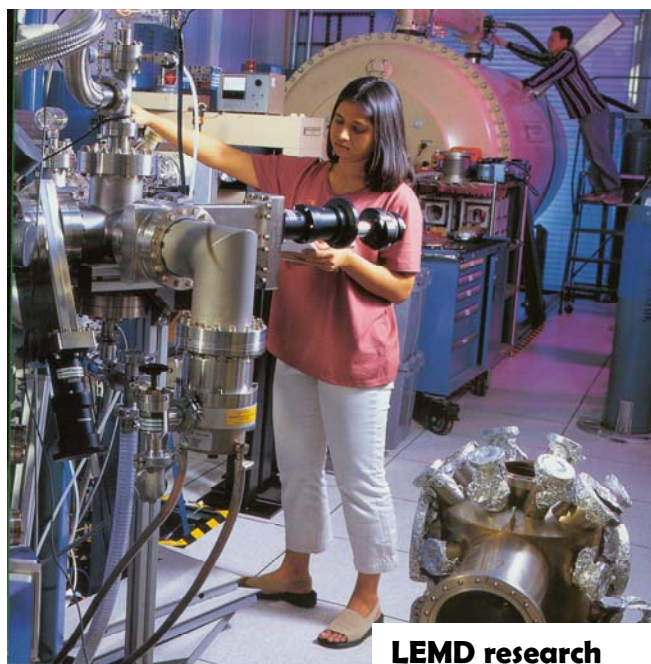
## Faculty Publications

1. M.D. Bermudez, W. Brostow, F.J. Carrion-Vilches, J.J. Cervantes and D. Pietkiewicz, Wear of Thermoplastics Determined by Multiple Scratching, e-Polymers no. 001 (2005)
2. M.D. Bermudez, W. Brostow, F.J. Carrion-Vilches, J.J. Cervantes, G. Damarla and J.M. Perez, Scratch Velocity and Wear Resistance, e-Polymers no. 003 (2005)
3. W. Brostow, V.M. Castano and G. Martinez- Barrera, Gamma irradiation effect on polystyrene + SRB blends: Morphology and hardness, Polimery 50, 657 (2005)
4. M.D. Bermudez, W. Brostow, F.J. Carrion-Vilches, J.J. Cervantes and D. Pietkiewicz, Friction and Multiple Scratch Behavior of Polymer + Monomer Liquid Crystals Systems, Polymer 46, 347 (2005)
5. I.M. Kalogeras, M. Roussos, I. Christiakis, A. Spanoudaki, D. Pietkiewicz, W. Brostow and A. Vassilikou-Dova, Dielectric properties of cured epoxy resin + poly(ethylene oxide) blends, J. Non-Cryst. Solids 351, 2728 (2005)
6. W. Brostow, M. Keselman, I. Mironi-Harpaz, M. Narkis and R. Peirce, Effects of carbon black on tribology of blends of poly(vinylidene fluoride) with irradiated and non-irradiated ultrahigh molecular weight polyethylene, Polymer 46, 5058 (2005)
7. H.N. Alshareef, H.C. Wen, H.R. Harris, K. Choi, H.F. Luan, P. Lysaght, P. Majhi, B.H. Lee, M. El-Bouanani, V. Ukride, Modulation of the work function of silicon gate electrode using thin TaN interlayers, Appl. Phys. Lett., 87, 521091 (2005)
8. T. N. Arunagiri, Y. Zhang, O. Chyan, M. El-Bouanani, M. J. Kim, C. T. Wu, K. H. Chen, and L. C. Chen, A 5 nm Ruthenium Thin Film as a Directly Plate-able Copper Diffusion Barrier, Appl. Phys. Lett., 86, 83104 (2005).
9. M. El Bouanani, P. Pelicon, A. Razpet, I. Čadež, M. Budnar, J. Simčič, Simple and accurate IBA dose normalization using a transmission mesh-based charge integration, (in press, NIM-B, 2005)
10. M.A. Quevedo-Lopez, R.M. Wallace, M. El-Bouanani, and B.E. Gnade, Method for removing contaminants on a substrate, U.S. Patent No: 6,933.235 B2 (2005).
11. J.A. Roepsch, B.P. Gorman, D.W. Mueller, R.F. Reidy, Dielectric Behavior Of Triethoxyfluorosilane Aerogels, Journal of Non-Crystalline Solids 336, 53-58 (2004)
12. P.D. Matz and R.F. Reidy, Supercritical CO2 Applications in BEOL Cleaning, Solid State Phenomena 103-104, 315-322 (2005)
13. E. Munoz, D. Coutinho, R.F. Reidy, A. Zakhidov, W.L. Zhou, K.J. Balkus, Synthesis of DAM-1 molecular sieves containing single walled carbon Nanotubes, Microporous And Mesoporous Materials 67, 61-65 (2004)
14. B.P. Gorman, R.A. Orozco-Teran, Z. Zhang, P.D. Matz, D.W. Mueller, and R.F. Reidy, Rapid Repair of Plasma Ash Damage in Low-k Dielectrics Using Supercritical CO2, Journal of Vacuum Science and Technology B, 22, 3, 1210-1212. (2004)
15. Z. Zhang, H. Dong, B. P. Gorman, D. W. Mueller, and R. F. Reidy, Copper Ion Behavior in Silica Xerogels, Journal of Non-Crystalline Solids, 341, 157-161 (2004)
16. H. Dong, B.P. Gorman, Z. Zhang, R.A. Orozco-Teran, J.A. Roepsch, D.W. Mueller, M.J. Kim, R. F. Reidy, Reinforcement Mechanism for Mechanically-Enhanced Xerogel Films, Journal of Non-Crystalline Solids, 350, 345-350 (2004)
17. R.F. Reidy, P.K. Nerusu, E.C. Chung, R.A. Orozco-Teran, P.P. Kadam, P.D. Matz, J.T. Rhoad, E.L. Busch, D.W. Mueller, Supercritical Pore Sealing of Porous MSQ, Advanced Metallization Conference, ed. D. Erb, P. Ramm, K. Masu, A. Osaki, p.493-497. (2004)
18. P.M. Capani, B.P. Gorman, R.F. Reidy, D.W. Mueller, E.R. Walter, P. D. Matz J.T. Rhoad, E.L. Busch, Drying Methods for Low- $\dot{\gamma}$  Films and Their Effects on Dielectric Constants, Advanced Metallization Conference 2004, ed. D. Erb, P. Ramm, K. Masu, A. Osaki, p.509-513.
19. R. A. Orozco-Teran, B. P. Gorman, D. W. Mueller, M. R. Baklanov and R. F. Reidy, Effect of silylation on triethoxyfluorosilane xerogel films by means of atmospheric pressure drying, Thin Solid Films, 471, 1-2, 145-153 (2005)
20. P.M. Capani, P.D. Matz, D.W. Mueller, M.J. Kim, E.R. Walter, J.T. Rhoad, E.L. Busch, R.F. Reidy, Observation of Intrusion Rates of Hexamethyldisilazane During Supercritical Carbon Dioxide Functionalization of Triethoxyfluorosilane Low-k Films, Materials, Technology and Reliability of Advanced Interconnects, Editors: Paul R. Besser, Andrew J. McKerrow, Francesca Iacopi, C.P. Wong, Joost Vlassak, MRS Proceedings Volume 863, B2.7 (2005)
21. Y.W. Heo, M. Kaufman, K. Pruessner, K.N. Siebein, D.P. Norton and F. Ren, "ZnO/cubic (Mg,Zn)O Radial Nanowire Heterostructures", *Applied Physics A*, published online, (DOI: 10.1007/s00339-004-2667-1). May, (2004)
22. M. J. Olszta, S. Gajjeraman, M. J. Kaufman and Laurie B. Gower, "Nano-Fibrous Calcite Synthesized via a Solution-Precursor-Solid (SPS) Mechanism", *Chemistry of Materials*, 16, 2355-2362. (2004)
23. G Lvov, V.I. Levit, and M.J. Kaufman, "Mechanism of Primary MC Carbide Decomposition in Ni-Base Superalloys", *Metallurgical and Materials Transactions*, 35A, 1669-1679. (2004)
24. M. J. Olszta, S. Gajjeraman, M. Kaufman and L. B. Gower, "Nanofibrous Calcite Synthesized via a Solution Precursor-Solid Mechanism", *Chem. Mater.* 16, 2355-2362. (2004)
26. Hansoo Kim, M. Kaufman and Wolfgang Sigmund 'Phase Transition of Iron inside Carbon Nanotubes under Electron Irradiation' Journal of Materials Research 19, 1835 (2004).
27. Erik Mueller, Kevin Kloske, M. Kaufman, Vladimir Levit, "EBSD Characterization of the Scale that Forms on Directionally Solidified PWA 1483 Castings", Proc. TMS Conference – TMS Letters, New Orleans, LA, (2004).
28. A. Ranade, N. A. D'Souza, Maleated and non-maleated polyethylene-montmorillonite layered silicate blown films: creep, dispersion and crystallinity • Polymer, 46, 7323 (2005)
29. J. Ratto and C. Thellen, A. Ranade, N. D'Souza, Surfactant concentration effects on amorphous PETG-montmorillonite layered silicate (MLS) nanocomposite films Polymer International 54, 875-881 (2005)  
(continued on page 7)

**Photo album**



**International visitors at LAPOM**



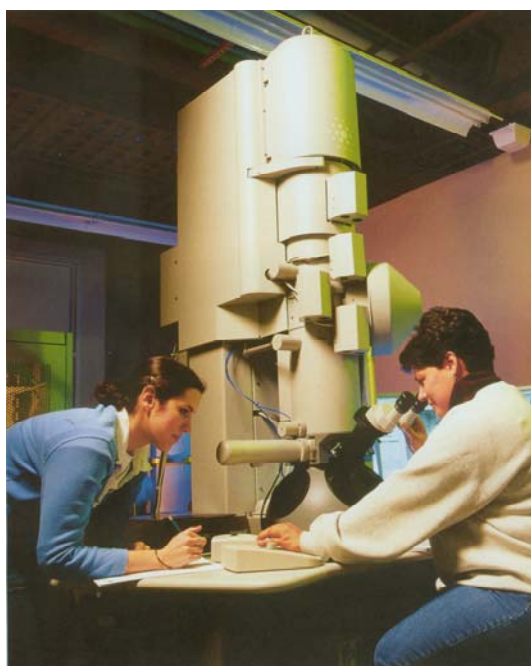
**LEMD research**



**Visiting International students from the University of Coahuila in Mexico**



**Gerry Wissler, Treasurer, South Texas SPE, 21st Century Polymers, awards SPE scholarship to Siddhi Pendse**



**Microscopes for learning**



**SPE students celebrate**

## Faculty Publications Cont.

30. A. Ranade, N. A. D'Souza, R. Wallace and B. Gnade, "High Sensitivity Gas Permeability Measurement System for Thin Plastic Films", Rev. Scientific Instruments 76, 013902 (2005)

31. W. Strauss and N. A. D'Souza, Polystyrene and montmorillonite nanocomposite supercritical foams, J. Cellular Plastics, 40, 229 (2004).

32. A. Shaito, N. A. D'Souza, D. Fairbrother, Non-Linear Creep Analysis of Polyethylene Nanocomposites, Antec, Boston, (2005).

33. Z. Yang, N.A. D'Souza, A Magnetorheological Study of Multi-walled Carbon Nanotube Dispersions, ANTEC, Boston, (2005).

34. Z. Yang, N.A. D'Souza, Mechanical Properties of Multiwalled Carbon Nanotube-epoxy Nanocomposites, ANTEC, Chicago, (2004).

35. L. Sahu and N. A. D'Souza, Polymer nanocomposites: permeability, chain dynamics, mechanical properties, APS March Meeting, Los Angeles, 2, p 971, (2005)

36. S. Pendse, N. D'Souza, J. Ratto, Deformation in Polymer Nanocomposites, ANTEC, Boston, 2005

37. N. A. D'Souza, Epoxy+clay nanocomposites, Encyclopedia of Nanoscience and Nanotechnology, Vol. 3. page 253-265 American Scientific Publishers (2004).

38. A. Ranade, N.A. D'Souza, B. Gnade. Polyamide-imide nanocomposites for high temperature wirecoatings in Polyimides and other high temperature polymers vsp (2005)

## Alumni Update

### Your Assistance is Needed

Let us know what's happening in your life. News of alumni will be published in future issues of this newsletter. So, please keep us informed! Stay connected!

## Alumni News

### Gary Withaeger

Lockheed Martin, Weatherford

Recent promotion in August 2005 at Lockheed Martin to Materials Engineer Staff. Two Children 3½ and 1½.

### Karl Yoder

Texas Instruments, Sherman

Recently changed from quality to process engineering. Karl lives in Sherman with his wife Heidi and two children: Jordan, 6 and Abigail 2.

### Todd Snively

Raytheon- Received Technical Honors 2003

Senior Failure Analysis Engineer. Lives in McKinney with wife Tammy and their 2 year old son. Jake. They are expecting a daughter, Emily, in January.

### Paul Flora

Lockheed Martin

Senior Materials Engineer for Lockheed Martin and enjoying his job.

### Jodi Roepsch

Raytheon -Senior Failure Analysis Engineer /Technical honors

Blessed with daughter Mia Trinity Roepsch on 8/9/05.

### Siddhi Pendse

Analytical Chemist in GE Advanced Materials. Mt. Vernon, IN

## New Grants

- **Texas Advanced Technology Program**, \$122,000 (2004-2005), Hydrogen charge trapping and degradation of Hf-based High-k Dielectrics on strained Si and SiGe CMOS, El Bouanani
- **National Science Foundation**, \$264,000 (2005-2007), "Research Undergraduate Experiences in Electronic Materials", El Bouanani
- **International Sematech, Advanced Gate Dielectrics**, \$6,000 (2005), Nuclear Reaction Analysis of high-k Dielectrics. - El. Bouanani
- **International Sematech, Advanced Gate Dielectrics**, \$4,800 (2005), RBS and XPS Analysis of ALD high-k Dielectrics. - El. Bouanani
- **Semiconductor Research**, \$50,000 (2005) Feasibility of CBED for Lattice Strain Measurement in Sub-Micron Devices.- Kaufman
- **Corporation (SRC) General Motors**, \$48,000 (2004) Determination of the Influence of Manganese and Heat Treatment on Experimental Cast Al Alloys. - Kaufman
- **Penn State**, \$25,000 (2005) Development of Handbook on Bulk Amorphous Alloys. - Kaufman
- **Army Research Lab**, \$4,050,000 (2005) Center for Advanced Research and Technology - Cooperative Agreement with Army Research Lab. - Kaufman
- **Natick Solider Systems**, \$19,000 (2005) Poly lactic acid and polycaprolactone biodegradable blends- D'Souza
- **Frito Lay**, \$1,840 (2004) Testing of steel springs -D'Souza
- **Haliburton**, \$8,050 (2004) Testing of composites - D'Souza.
- **Army**, \$24,882 (2004-05) PET Nanocomposites -D'Souza
- **Boston Scientific**, \$5,500 (2004) Microgels -D'Souza
- **Zyvex**, \$4,500 (2005) Testing of nanotube composites. - D'Souza
- **Halliburton**, \$4,500 (2005) Testing of elastomers. - D'Souza
- **Poco Graphite**, \$1,200 (2005) Testing of graphite rods - D'Souza
- **NSF-DMR**, \$992,000 (2003-07) Nanoscale Characterization and Development of Ultra Low-k Dielectric Xerogel Films. -Reidy, Kim, Mueller
- **SEMATECH**, \$175,000 (2004-2006) Fundamental Research of Supercritical Carbon Dioxide Wafer Cleans Technology for Post-Etch Cleans-Reidy
- **NASA**, \$79,000, (2005-06) Nonlinear creep in nanostructured balloon films - D'Souza
- **NIST**, \$71,000 (2005) Flame retardant polymers with layer double hydroxides, -D'Souza, N. A. and Braterman, P. B.
- **NSF**, \$99,954, Planning for an Innovative Interdisciplinary Mechanical and Energy Engineering Curriculum - Mirshams, R. A, D'Souza, N. A, Garcia, O., Varanasi, M and Seifollah, N.

## Chair's message continued

Pennsylvania State University (BSc) and the University of Alabama-Tuscaloosa (PhD) and has worked as a post-doc at the Naval Research Laboratory in Washington, D.C. Tom brings us expertise in the area of micro and nanotribology, atomic layer deposition, and materials for MEMS. Nigel is a graduate of The University of Florida and works in the area of fabrication and electro-optical characterization of electroluminescent materials and devices. Applications include information displays, solid state lighting infrared imaging, and chemical and biological sensors. We are currently looking for two additional faculty.

In addition to the faculty growth, the department and college have been fortunate to receive two congressional appropriations that were focused on establishing the new college as well as an interdisciplinary center for advanced research and technology. This has allowed us to acquire a suite of very sophisticated processing and characterization equipment. In fact, the specific collection of nanometrology tools (analytical high resolution TEM, dual beam FIB/SEM and local electrode atom probe (LEAP) that we have acquired is, as far as we know, unique in academic institutions around the world and provide us with the ability to do nano and atomic level characterization and tomography. Our faculty members are working hard to capitalize on this uniqueness by targeting federal and private funding sources to support their research.

Our Regents professor, Dr. Witold Brostow, has continued to be our "international" faculty member. He is currently the President of International Council of Materials Education(ICME). The Council has its office at UNT. He is also the President of the Scientific Committee of the POLYCHAR World Forum on Advanced Materials. At UNT he is the Director of the Laboratory of Advanced Polymers and Optimized Materials (LAPOM). He is also a member of the scientific council of the Emil Zeadlowicz Museum in Wadowice, a member of the European Academy of Sciences in Brussels, and a member of the National Academy of Sciences in Mexico City. Finally, he was recently invited to become a Fellow of the International Union of Pure and Applied Chemistry (IUPAC).

Dr. Mohamed El Bouanani has worked tirelessly to maintain the Laboratory for Electronic Materials and Devices, which was previously maintained by him, two of the departing faculty and their technicians. In addition, Dr. El Bouanani has been successful in finding support for his research efforts in the area of high k dielectrics from both Sematech and the Texas Advanced Technology Program. He has also been involved in outreach efforts including being co-principal investigator on an NSF Research Experience for Undergraduates (REU) program, the second such grant, to provide summer research experiences to undergraduates from around the country.

Our graduate coordinator, Dr. Nandika D'Souza, has continued to contribute to the department in many areas of research and service. Besides being the graduate coordinator, a daunting task to say the least, she has managed to be very productive in her research efforts by securing research support from such agencies as the Army, NASA and NIST as well as several private companies including Halliburton, Frito Lay, Zyvex and Boston Scientific. She is recognized as an expert in the area of polymer nanocomposites for such applications as flexible displays, barrier materials, flame retardant applications and high altitude balloons.

Dr. Richard Reidy has developed a somewhat unique capability in the area of supercritical processing. He has support from Sematech who sees this technology as important to the future development of advanced microelectronics. He teamed up with Prof. Dennis Mueller (affiliate professor of MSE) of Physics, Prof. Moon Kim of UT-Dallas, and Dr. Phil Matz of Texas Instruments to secure an NSF GOALI program to support his work in development and characterization of low-k dielectrics. Dr. Reidy is also quite active in several areas of service including the Faculty Senate, chairing the University Library Committee, working with other universities in the DFW area on the Metroplex Research Consortium for Electronic Devices and Materials, and with industry as a focus team co-chair of International Technology Roadmap for Semiconductors.

Our student population also took a hit when the three faculty members left and took some of their programs and students with them. But we are rebuilding with new students from various locations around the world and are attempting to increase the number of research assistantships and other scholarship and fellowship opportunities that are available to potential students. We are hopeful that the new faculty, equipment and successful research programs will increase our attractiveness to both US and international students.

We have also initiated a new industrial advisory board and have been fortunate to attract a group of individuals from a variety of local industries in the Dallas-Fort Worth Metroplex to serve on this board. The board is working with our faculty to accomplish a series of departmental improvements related to curriculum, enrollment, coops and fellowships, and to help us better prepare our students to meet their needs.

In closing, it is an exciting time at the University of North Texas and our faculty and students look forward to a productive and rewarding year. We are especially grateful to the College and the University for their support of our efforts and we welcome everyone interested in joining this exciting program.

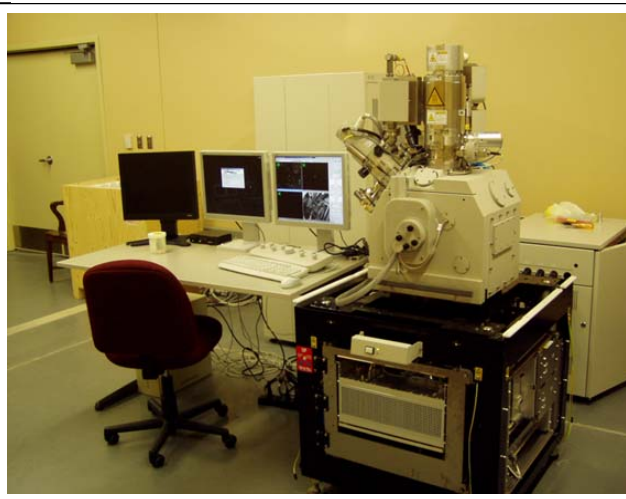


**Recent Instrumentation Acquisitions**



**FIB/SEM Dual Beam  
(CART)**

**Technai F20 AHR TEM (CART)**



**XPS / in-situ  
processing**

**MBE-PVD cluster  
deposition tools and  
Ion Beam Accelerator**



**LEAP  
(CART)**

## Recent Instrumentation Acquisitions



**Horizontal and Vertical Burn Chamber**



**Taber abraser with electrophotometer**



**Pin-on-Disk Tribometer**



**Magnetorheological fluid (MR) cell for rheometer**

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