Peter O’Donnell Receives UH Volunteer of the Year Award

Peter J. O’Donnell, Jr., President of the Dallas-based O’Donnell Foundation and member of the TCSUH Advisory Board, received the TCSUH/UH Volunteer of the Year Award on April 18 at the Hyatt Regency Hotel. The award recognizes outstanding individuals who have assisted specific UH programs in an exemplary way and is presented each year during the UH Annual Report to the Community.

"Peter O’Donnell has offered long-term support to TCSUH since its inception, and has been a guiding force in the growth of our research programs," said Paul C. W. Chu, TCSUH Director. "His leadership and stewardship has been a determining factor in the success of our Center, and we are delighted that he is being recognized by the University of Houston.”

O’Donnell has been involved in public and higher education on a local, state and national level. He is a former trustee of the Excellence in Education Foundation, has served as Commissioner of the Texas National Research Laboratory Commission (1988-1991), and was a member of the Governor’s Advisory Committee on the Superconducting Supercollider (1994). He is a member of the University of Texas (UT) Austin Engineering Foundation Advisory Council, the UT Dallas Engineering Advisory Council, the Texas Foundation for Higher Education, and the Fund for Molecular Research at the UT Southwestern Medical Center. O’Donnell also serves as Co-Chairman of the President’s Council of the National Academy of Sciences and as Trustee of the George Bush Presidential Library Foundation.

His dedication to education has resulted in numerous awards, including the highest honor the UT System bestows, the Santa Rita Award; the James K. Wilson Silver Cup Award; the Linz Award; and the Southwestern Medical Foundation Community Service Award.

Manuel Cardona Presents TCSUH Distinguished Lecture

Manuel Cardona, Director of the Max-Planck-Institut für Festkörperforschung in Stuttgart, Germany, spoke as a TCSUH Distinguished Lecturer on April 27. His talk, entitled "Crystals With a Tailor-Made Isotopic Composition," drew over 150 researchers, faculty, and students from UH and the Houston community.

Cardona began his lecture by explaining that since the collapse of the Soviet Union, large quantities of stable isotopes of most elements in the periodic table have become available, including crystals with tailor-made isotopic compositions. He then discussed the physical properties of these crystals.
Figure of Merit
Ultra-High Growth Rate Attained by Photo-Assisted MOCVD

Through the use of Photo-assisted Metalorganic Vapor Deposition (MOCVD), TCSUH's HTS Thin Film Growth and Processing Laboratory, led by Prof. Alex Ignatiev, has been able to increase the growth rate of YBCO film beyond that achieved through other fabrication techniques. These high growth rates have been achieved in a number of runs. The accompanying graph depicts the growth rate of the four major YBCO film fabrication techniques, including photo-assisted MOCVD. Data was taken from YBCO with $J_c$ of $\sim 1 \times 10^6$ A/cm$^2$. This technique is currently being applied to thick film YBCO growth for use in YBCO wires and tapes.

South Korea, cont. from p. 1

Studies, where he continued to address democratic reforms in South Korea, human rights issues, unification, and economic cooperation across Asia. He currently serves as Chair of the Kim Dae Jung Peace Foundation, Co-President of the Forum of Democratic Leaders in the Asia Pacific, and Honorary Chairman of the Korean Institute for Human Rights in Alexandria, VA., and is a member of the Board of Director of LaRoche College in Pittsburgh, PA., and the Robert F. Kennedy Foundation.

Cardona, cont. from p. 1

and their potential application in high-temperature superconductivity.

Cardona is considered one of the world’s leading experts in Raman spectroscopy. His research group at the Max Planck Institute, where he has been the Director since 1971, is investigating a variety of areas, including optical spectroscopy of semiconductors and high-temperature superconductors.
TCSUH and DOE Form Research Partnership

Deputy Secretary of Energy Bill White announced on June 23 that the Department of Energy (DOE) is awarding a grant to TCSUH to further develop technology which uses energy-saving high temperature superconductors (HTS’s) in electricity generation, delivery and use.

“This new award to TCSUH will greatly improve the national program’s chances for success,” said White. “It will augment the Center’s world-class work on the development of HTS material and HTS bearings.” Initial funding for FY 1995 includes $419,000 from DOE, with $419,000 in matching funds from the State of Texas.

The effort is part of the DOE’s Office of Energy Efficiency and Renewable Energy partnership program to research and develop energy applications of HTS. This program enables the United States to benefit from future energy savings, as well as position American industry to enter the predicted multi-billion dollar a year market for future energy systems such as motors, generators, current limiters, and transmission cables.

TCSUH scientists, led by Paul C. W. Chu, will focus on the research and development of the newly discovered mercury-based compounds being developed by TCSUH for wires and tapes. The group will work with Intermagnetics General Corporation of Latham, NY, a leader in superconducting wire manufacturing and a member of the TCSUH Industrial Research Consortium, to improve the material and devise practical material processing steps.

TCSUH will also work on the design and characterization of HTS bearings and the HTS materials to be used in their construction. Superconducting bearings are a critical component of flywheel energy storage (FES) systems. FES will allow utilities to store energy produced when demand is low for use during peak times. Without the technological breakthrough represented by the superconducting bearings, large friction losses make such systems economically unfeasible.

Commonwealth Edison Corporation in Chicago is leading an FES project that will more effectively utilize their existing generation capacity. Under the direction of

Students Present Research Results at Symposium

Ten students working in TCSUH laboratories made presentations of original research to faculty, researchers, and students at the Twelfth Semiannual TCSUH Luncheon and Student Symposium on May 4. The symposium is a juried competition in which prizes are awarded to first ($200), second ($100) and third ($50) place winners. Winners and participants are listed below.

First Place: Sandeep Pendharkar, HTS Thin Film Devices Laboratory, "Fabrication of Silicon Stencil Masks for Ion Beam Lithography."
Second Place Tie: Allen Linnen, HTS Wire and Large Grain Processing Laboratory, "Room Temperature Superconductors in Space," and Michael Heath Rasmussen, HTS Novel Materials Research Laboratory, "in situ Measurements of the Urbach Tail in C_{60} Thin Films."
Participants: Srinath Athur, HTS Bulk Processing and Mechanical Properties Laboratory; Rambis Chu, Ion Beam Processing and Characterization Laboratory; Tian-Qiao Huang, HTS Thin Film Growth and Processing Laboratory; Sergio Pitanga, HTS Trapped Field Applications Laboratory; Xiaodong Qiu, High-Pressure, Low-Temperature Laboratory; James Qu, HTS Levitation Applications Laboratory; Qi Wang, HTS Ceramics and Ceramic Composites Laboratory; and George Zou, HTS Device Applications Laboratory
Judges: Pen Chu Chou, HTS Thin Film Growth and Processing Laboratory; Non-Qiang Fan, HTS Device Applications Laboratory; and Yu-Yi Xue, High-Pressure, Low-Temperature Laboratory
Session Chairs: Ruling Meng, High-Pressure, Low-Temperature Laboratory; Pei-Herng Hor, HTS Novel Materials Research Laboratory
TCSUH Welcomes New Researchers

Three researchers joined TCSUH between April and June of 1995. Yong-Cong Chen joined the HTS Theoretical Material Research Laboratory as a Research Associate. He comes to TCSUH from the University of Science and Technology in Anhui, Hefei, PRC. He received a Ph.D. (1987) and M.S. (1985) in Condensed Matter Science from the University of Illinois and his B.S. in Condensed Matter Science from University of Science and Technology, PRC in 1982. He is investigating the theory behind HTS.

Laurens Jansen, a chemical physicist with the Theoretische Physik - Swiss Federal Institute of Technology, Hönggerberg in Zürich, Switzerland joined the High-Pressure, Low-Temperature Laboratory as a Visiting Researcher during May 1995. While at TCSUH, he conducted experiments on the pressure effects on $T_c$ in under-doped and over-doped $\text{HgBa}_2\text{CuO}_4$. He also delivered a talk to TCSUH researchers titled "Superexchange and Superconductivity: A Possible Correlation."

Jin-Tong Wang, Professor of Physics at Lincoln University in Pennsylvania, joined the High-Pressure, Low-Temperature Laboratory as a Visiting Researcher on June 1. He is studying the melt-texture technique for processing large superconductors that can carry large electrical currents and the processing and characterization of HTS thin films. Dr. Wang will work at the Center until August 5.

TCSUH Researchers Present Papers at Spring MRS Meeting

TCSUH researchers presented the following papers at the Spring Meeting of the Materials Research Society (MRS), held April 18-21 in San Francisco, CA.

"Deposition and Anisotropic Behaviors of (110)-Oriented Superconducting YBCO Thin Films," Q. Y. Chen
"An Admittance Spectroscopy for a PZTO/YBCO Ferroelectric-Superconductor FET," H. Lin
"Bulk Polycrystalline Melt-Textured YBCO Bars For High Current Applications," A. S. Parikh
"Estimation of Residual Stresses and Reaction Products in Composite BPSO Tapes," C. Vipulanandan
"Study of Growth Kinetics In Melt-Textured YBCO," S. P. Athur
"Hg-1201 Stoichiometry and Possible Defects," Q. Xiong
"High Quality Purely a-Axis Oriented YBCO Films Prepared By Photo-Assisted MOCVD With High Growth Rate," P. C. Chou

TCSUH Seminars

The TCSUH Seminar Series provides a medium for internal information exchange and affords an opportunity for public education and outreach. One Distinguished Lecture, eight Special Seminars and one Monthly Seminar were held between April 1 and June 30, with the following speakers:

TCSUH Distinguished Lecture Series
Manuel Cardona, Max-Planck-Institüt für Festkörperforschung, Stuttgart, Germany, "Crystals with a Tailor-Made Isotopic Composition," 4/27 (See article p. 1)

Special Seminars
Ping Ao, Department of Theoretical Physics, Umeå University, Sweden, "Vortex Dynamics in Superconductor Tunneling and Hall Effect," 4/3
Ru-Shi Liu, Materials Research Laboratories, Industrial Technology Research Institute, Hsinchu, ROC, "The Applied High Tc Superconductivity Research at Materials Research Laboratory/ITRI, Taiwan," 4/11
Dingquan Xiao, Materials Science & Engineering, Sichuan Union University, Department of Materials Science, Chengdu, PRC, "Growth and Mechanisms of Metal Oxide Thin Films Prepared by Multi-Ion Beam Reactive Co-Sputtering," 5/5
Hanns-Ulrich Habermeier, Max-Planck-Institüt für Festkörperforschung, Stuttgart, Germany, "High Temperature Superconductor Thin Film Preparation – Recent Development," 5/11
Chunli Bai, Institute of Chemistry, Chinese Academy of Sciences, Beijing, PRC, "Recent Advances in DNA Research," 5/12
Bob Hawsey, Science and Technology Center, Oak Ridge National Laboratory, Oak Ridge, TN., "Overview of ONRL: Key Research Areas and Recent Technical Accomplishments," 6/29
Alvaro Ferraz, International Center for Condensed Matter Physics, University of Brasília, Brazil, "Quasiparticles, Fermi Liquid Breakdown, and Superconductivity," 6/30

Monthly Seminars
Dean Peterson, Superconductivity Technology Center, Los Alamos National Laboratory, Los Alamos NM, "Development of High Temperature Superconductors at Los Alamos National Laboratory," 6/13
Students Receive Degrees With TCSUH Support

In May 1995, six students working in TCSUH laboratories were awarded B.S., M.S., or Ph.D. degrees from the departments of Physics, Chemistry, Chemical Engineering and Electrical Engineering.

A. Agrawal, M.S., Materials Engineering. Thesis: "Processing and Characterization of Al/ SiC Composites Manufactured by Hot Isostatic Pressing" (HTS Bulk Processing and Mechanical Properties Laboratory).


Rodger Cooley, B.S., Physics (HTS Levitation Applications Laboratory).


Vassiliki Milonopolou, Ph.D., Chemical Engineering. Dissertation: "Kinetics of Formation of YBaCu3O7-x Superconductor and La1-xSrxCrO3 Interconnects" (Solid State Chemistry Laboratory).

Sandeep Pendharkar, Ph.D., Electrical Engineering. Dissertation: "Reactive Ion Etching of Silicon in Br2 Plasmas for Stencil Mask Fabrication" (HTS Thin Film Devices Laboratory).

Chi-Fo Tsang, Ph.D., Chemistry. Dissertation: "Phase Equilibria in the Bismuth-Strontium-Calcium-Oxygen and Bismuth-Calcium-Copper-Oxygen Systems at 1 atm of Oxygen" (Materials Characterization Laboratory). Dr. Tsang is now a Post-Doctoral Fellow at the University of Texas at Austin.

TCSUH Visitors

Over 25 tours, demonstrations, and meetings were conducted at TCSUH for international visitors, government and industry officials, elementary and secondary school student and teachers, and other U.S. and international university representatives between April 1 and June 30, 1995.

International Visitors/Delegations

Ping Ao, Department of Theoretical Physics, Umea University, Sweden 4/3

Ru-Shi Liu, Materials Research Laboratories, Industrial Technology Research Institute, Hsinchu, ROC 4/11

Ivan C. da Cunha Lima, Centro de Technologias Associates, Instituto National de Pesquisas Espaciais, Sao Jose dos Campos, Brazil 4/24-27

Wenping Zhang, Personnel & Education Division, China Petrochemical International Company; Yuanda Xu, Deshan Ru and Shan Xi, Petrochemical Management Personnel College; Du Hongyin, Economy & Trade Consulting Co., Ltd., Beijing PRC 4/24

Laurens Jansen, Theoretische Physik, ETH - Hönggerberg, Zürich, Switzerland 5/1-31

Manuel Cardona, Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany 4/27

Dingquan Xiao, Department of Materials Science, Sichuan Union University, Chengdu, PRC 5/5

Akira Tonomura, Advanced Research Laboratory, Hitachi, Ltd., Saitama, Japan 5/9

Kim Dae Jung Delegation, The Kim Dae-Jung Peace Foundation for the Asia-Pacific Region, Seoul, South Korea 5/10

Hanns-Ulrich Habermeier, Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany 5/11

Chunli Bai, Institute of Chemistry, Chinese Academy of Sciences, Beijing, PRC 5/11

E. Friedland, Physics Department, University of Pretoria, South Africa 5/19


Alvaro Ferraz, International Center for Condensed Matter Physics, University of Brasilia, Brazil 6/30

Government and Industry

John H. Hops, Jr., Materials Research Division, National Science Foundation, Arlington VA 5/1

U. Balachandran, Ceramics Section, Materials & Components Technology Division, Argonne National Laboratory, Argonne IL 5/17

Dean Peterson, Superconductivity Technology Center, Los Alamos National Laboratory, Los Alamos NM 6/13-14

Robert Sokolowski, Intermagnetics General Corporation, Latham NY 6/28-29

Robert Hawsey, Science and Technology Center, Oak Ridge National Laboratory, Oak Ridge TN 6/29

University Visitors

Energy Storage Technology Institute (25 visitors), Austin TX 4/6

Two-Year College Chemistry Consortium (25 visitors), Houston TX 4/7

Karol Lang, Department of Physics, University of Texas, Austin TX 4/18

Elementary & Secondary Education

Austin High School Honors Chemistry Class (27 students), Houston TX 4/5

Corpus Christi Catholic School (24 students), Corpus Christi TX 4/10

HISD Most Improved Students (4 students), Houston, 4/13

Deer Park High School Honors Physics Students (35 students), Deer Park TX 5/12

Lanian Middle School (145 students), Houston TX 5/22


"Damage Caused by Magnetic Pressure at High Trapped Field in Quasi-Permanent Magnets Composed of Melt-Textured YBCO Superconductor," Y. R. Ren, R. Weinstein, J. Liu, R. P. Sawh and C. Foster submitted to Physica C (April 1995); Ref. No. 95:046


"Phase Equilibria of the La$_2$O$_3$:SrO-CuO System at 950 °C at 10 Kbar," J. Geny, J. K. Meen and D. Elthon, submitted to Journal of the American Ceramic Society (April 7, 1995); Ref. No. 95:044


DOE, cont. from p. 3

Wei-Kan Chu, TCSUH scientists will investigate crucial issues of FES; tailor, refine, and deliver HTS disks for bearing applications; and examine processing steps leading to industrial production of HTS disks.

TCSUH supporters on hand to accept the award were the Hon. Gene Green and the Hon. Ken Bentsen, U. S. House of Representatives; the Hon. Talmadge Heflin, State Representative; the Hon. Alex Schilt, UH System Chancellor; the Hon. Bill Hobby, UH System Chancellor-designate; James Pickering, UH President; and Robert Hinds, Director of Economic Development, City of Houston.
TCSUH Researchers Receive Awards at HTS Workshop

Two awards were presented to TCSUH researchers on June 21 at the 1995 International Workshop on Superconductivity, held in Maui, Hawaii. Co-sponsored by the International Superconductivity Technology Center of Japan and the Material Research Society, the "Workshop Material/Device Performance Awards" provide an overview of the latest advances in HTS materials research. According to Kenneth Goretta, MRS Program Chairman, the entries in this year's contest showed how far the field has come since the last Workshop was held in 1992. While entries in the previous Workshop focused mainly on materials, this year's entries showed an emphasis on HTS applications.

Researchers in the TCSUH HTS Levitation Laboratory received an award in recognition of the superior performance of the bearing applications, used in TCSUH's prototype flywheel for energy storage and lunar telescope mount. Wei-Kan Chu, Task Leader, accepted the award for fellow team members Ki Ma, Harold Xia, Mark Lamb, Rodger Cooley, Quark Chen, Chase McMichael, and Clay Fowler. The TCSUH-patented hybrid bearings and design for flywheel for energy storage systems were showcased in the friendly competition.

Roy Weinstein, Task Leader of the TCSUH HTS Trapped Field Applications Laboratory, received a superior performance award for trapped field magnets which achieve 8.3 Tesla at 55 K in a sample 3.3 cm long and 2 cm in diameter. Weinstein has since reported that even higher fields of 10.1 Tesla have been obtained in the same size sample with an activation field of 11 Tesla.

TCSUH Visitors (See p. 5)

The Hon. Ken Bentsen, U.S. House of Representatives, toured TCSUH laboratories. The Hon. Talmadge Heflin, C. W. Chu and the Honorable Gene Greene at the DOE/TCSUH Announcement. See article, p. 3. Dr. and Mrs. Kim Dae Jung (center) visited TCSUH with C. W. Chu (far left) and Wei-Kan Chu (far right). See article, p.1

All Photos by TCSUH - Office of Public Affairs