

## Curriculum Vitae

**DAVID T. HAYHURST**

Dean

College of Engineering

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### EDUCATION

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Ph.D.	<b>Worcester Polytechnic Institute</b> , Worcester, MA Chemical Engineering	1976
M.S.	<b>Massachusetts Institute of Technology</b> , Cambridge, MA Chemical Engineering	1973
B.S.	<b>Worcester Polytechnic Institute</b> , Worcester, MA Chemical Engineering Minor, Art History	1972

### PROFESSIONAL EXPERIENCE

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#### San Diego State University

*San Diego, CA*

- Dean, College of Engineering 2002 – Present
- Professor 2002 – Present

#### University of South Alabama

*Mobile, AL*

- Dean, College of Engineering 1992 – 2002
- Professor 1992 – 2002

#### Cleveland State University

*Cleveland, OH*

- Chair, Department of Chemical Engineering 1985 – 1991
- Professor 1988 – 1991
- Associate Professor 1981 – 1988
- Assistant Professor 1976 – 1981

#### Private Industry

- Consultant, Molecular Sieve Zeolites

**MAJOR ACCOMPLISHMENTS**

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**SAN DIEGO STATE UNIVERSITY**

*Founded in 1897, San Diego State University is an urban, comprehensive institute having over 34,000 students. In Fall 2012, the University received 80,000 applications for approximately 8,000 new and transfer student openings. The University has colleges of Arts and Letters, Business Administration, Education, Engineering, Health and Human Services, Professional Students and Fine Arts, Sciences, Undergraduate Studies, Extended Studies and a campus in California's Imperial Valley.*

**Dean, College of Engineering**

Administer all internal and external activities of the College of Engineering, consisting of four departments and eight academic programs. Each undergraduate program is accredited by the Accreditation Board for Engineering and Technology, Inc. (ABET). The College has more than 2,200 undergraduate and 400 graduate students enrolled in bachelors, masters and doctoral degree programs.

**Significantly Raising Visibility**

Since joining the University in 2002, my vision has remained constant: to significantly raise the visibility of the SDSU College of Engineering regionally, nationally and internationally, in all areas including academic programs, research and outreach to the community. It is the accomplishment of which I am most proud.

- Engineering enrollments have grown by more than 43% since 2007 (901 FTES, Fall 2007 to 1290 FTES, Fall 2012, headcount is approximately 2x FTES). Similar numbers are seen in the number of students applying for graduation (400 in Spring 2007 to 583 in Spring 2012).
- Reasons for the sustained growth include: effective outreach to middle and high schools through the expanding *Project Lead the Way* and MESA programs; creating a new initiative to attract veterans into engineering; improving the effectiveness of retention programs including our MESA Engineering Program (MEP) and its extension to community colleges (with the financial support of the National Science Foundation STEP program); an expansion of undergraduate and graduate degree offerings (Construction Engineering, MS in Bioengineering, Masters of Engineering) and three new Joint Doctoral Programs (JDP) programs with the University of California at San Diego (Structural Engineering, Bioengineering, Electrical and Computer Engineering).

**Boosting Scholarly Productivity**

A second major accomplishment is boosting the scholarly productivity for the College of Engineering.

- College research activities have grown and matured, creating a new culture among the faculty. Several focus areas have evolved, with teams of faculty collaborating in these areas, including material synthesis and processing; sensorimotor neural engineering; alternative energy and power engineering; water resources; and wireless communication and computational fluid mechanics, to name a few.
- Growth in research funding and in the number of peer-reviewed publications has been steady.
- Technology transfer has provided new financial resources for the College.
- A notable achievement is the selection of the College of Engineering for a *National Science Foundation Engineering Research Center (ERC) in Sensorimotor Neural Engineering*. SDSU is a key member of a three-university team composed of University of Washington (lead), MIT and San Diego State University. This award is for \$37 million over 10 years with an expectation that an equal amount will be raised from industry. SDSU is responsible for creating embeddable wireless sensors along with a focus on preparing a diverse work force in neural engineering.

- In addition to the NSF-sponsored Engineering Research Center, the Department of Energy has announced the awarding of a \$3.9 million grant to the College (specifically Mechanical Engineering) under their SunShot program. This funding exceeds the amount awarded by DOE to any other academic institution. The work, in collaboration with several industry partners, will focus on a novel approach for converting sunlight into electricity using air with carbon nanoparticles, rather than water, as the working fluid.

### **Industry / Government Laboratory Engagements**

- Establish a Dean's Advisory Board to engage senior leadership in Southern California engineering companies in shaping a vision for the College. Industries include: Qualcomm, Northrop Grumman, San Diego Gas & Electric, Cubic Corporation, General Dynamics, Cymer, Solar Turbines, L-3 Communications, SPAWAR (Navy Research Laboratory), various construction companies, etc.
- Partner with regional industry support associations, such as CONNECT (Member, Board of Directors), BIOCOM, and San Diego Economic Development Corporation. The executive directors of each serve on my Dean's Advisory Board.

### **Overcoming Budget Constraints**

- During the past 60 months, the College of Engineering (along with the entire University) has experienced significant budget cuts resulting in curtailed hiring for both faculty and staff. In fact, during this five-year period, the total budget for the University has dropped from \$308 million per year to \$235 million per year, with proportional cuts to each University division.
- Through a collaborative process that began with the College's leadership team, and then the entire faculty, a plan was created to make permanent budget cuts as required by the University. This was accomplished without loss of faculty or staff (only through attrition) while at the same time, minimizing impacts on student enrollment and research productivity.
- Because of our effective student recruitment and retention programs, and the resulting enrollment growth, cuts to the College of Engineering budgets have been partially offset by enrollment growth funding. These additional resources have allowed the College to maintain the quality of our instructional and research programs and weather the budget tsunami.

### **Supporting Diversity**

- The College has achieved significant diversity, with students of color being the majority.
- Hispanic enrollment currently exceeds 25% (the University is now recognized as an HSI). Other minority groups are equally well represented. Our student demographics mirror the diversity of Southern California.
- Because of the various support programs for underrepresented students, the freshmen to sophomore continuation rates for this cohort match the College average 76.2% versus 76.8% (five-year average).

### **Programs**

- Launched a new engineering entrepreneurship program to transition technologies developed by faculty, staff and students to create new high-tech businesses using an on-campus incubator. This effort was developed with the support of the College of Business Administration and the Entrepreneurial Management Center. *The Zahn Center for Engineering Innovation* was launched March 16, 2012 with the grand opening of a newly renovated facility that serves to incubate new businesses for 18 to 24 months, preparing these student and faculty-led companies for venture funding. The center was created with a \$700,000 lead gift from a local businessman, Mr. Irwin Zahn. A subsequent gift of \$1 million has been received from the donor to further stabilize long-term funding and create a new initiative in *Social Entrepreneurism* which will to engage the entire University community.
- Created new program called SERVICE (Success in Engineering for Recent Veterans through Internship and Career Experience). This program connects veteran students with high-tech careers in engineering through internships, resulting in a dramatic improvement in retention and placement for these exceptional students. This program is often featured by the National Science Foundation as a best practice.

- Expanded enrollment in the College's Master of Engineering degree program. The Master of Engineering curriculum emphasizes both technology and business. It was developed in response to a need identified by local industry. The program is offered on site at QUALCOMM. Approximately 40 QUALCOMM employees/students participated in the first cohort. A second cohort began their studies at QUALCOMM this spring.
- Expanded the College's current Joint Doctoral Program (JDP) with the University of California at San Diego to include all degree programs in the College. Faculty access to doctoral students is critical to the College's expanded research mission.
- Established study abroad programs in Poland, Italy, France, India and Panama where students enroll both in an engineering course along with a course on local culture. A further study-abroad program in northern France is being developed focusing on international entrepreneurship.
- Completed ABET accreditation reviews for all programs in Fall 2009, including the initial accreditation for construction engineering. All programs received the maximum six-year accreditation.
- Expanded the College internship program to include community college students who intend on majoring in Engineering. Internships are a critical part of our NSF-sponsored program (entitled the STEP Partnership for San Diego) and significantly improve undergraduate continuation rates.

### **Fundraising**

- Increased annual philanthropic donation to the College of Engineering. The College received donations of more than \$3.8 million this past academic year. This year's donations already exceed \$3.2 million.
- Partnered with The College of Education and the College of Undergraduate Studies to form the QUALCOMM Institute for Student Success and Innovation. QUALCOMM Corporation provided \$14.7 million in a blend of endowment and cash investments to create this Institute in 2004. Endowment from this gift continues to support programs in all three colleges. For the College of Engineering, funding from this gift provides continuing support for our state leadership in Project Lead the Way.
- Created the William Leonhard Chair of Civil and Environmental Engineering (\$2.2 million endowment). An Endowed Chair is currently being created for wireless communication with lead gifts from Eric and Peggy Johnson and Joe Kiani.
- Philanthropic support from industry:
  - Over \$900,000 in cumulative support from Cubic Corporation for wireless communication and digital signal processing program (\$100,000 per year for nine years);
  - \$200,000 from QUALCOMM for general support of the College of Engineering and a \$1.2 million endowment for our *Project Lead the Way* program.
  - \$200,000 from Northrop Grumman Corporation for our veterans program.
  - Approximately \$20,000 per year for the MESA Engineering Program (MEP) to support at-risk students.
  - \$25,000 from General Atomics for statewide K-12 competitions for *Project Lead the Way*.
- Current philanthropic priorities for the College include the creation of an endowed chair in digital signal processing (\$3 million); formation of an Institute for Engineering Entrepreneurship (\$6 million); annual support for the construction engineering program; endowing a chair in Construction Management (\$3 million); endowing the position of director for our Troops to Engineers program; endowing the study abroad program (\$5 million); etc. Prospects have been identified and lead gifts have been received for many of these initiatives.
- Participating with other University leadership in fundraising for SDSU's comprehensive campaign, with a target of \$500,000,000.

### **Special Initiatives**

- Since 2003, SDSU has been the Affiliate University for *Project Lead the Way* (PLTW) in California. PLTW trains teachers to provide rigorous engineering courses to middle and high school students. The statewide growth in *Project Lead the Way* has been amazing. This fall, over 420 middle and high schools statewide will offer the PLTW curriculum.

- The College of Engineering is home to the MESA Programs (Mathematics, Engineering and Science Achievement Programs) for both San Diego and Imperial Counties, receiving approximately \$300,000 annually to support these efforts. MESA is the premier afterschool program focused on increasing the number of minority students who enrolled in math, science and engineering.
- Maintained an active Engineering Deans' Advisory Board with approximately thirty-five industries, community leaders and alumni represented.
- The College has undertaken two new programs, in strategic alignment with the University's Troops to College initiative, entitled, Transitioning Troops to Engineering and an internship program for veterans called SERVICE. The intent of these efforts is to double the number of active military and veteran students who enroll in and graduate from the College of Engineering. Initial support has been provided by the National Science Foundation, \$400,000. Additional funding has been received from various industries and private foundations. Currently, approximately 20% of all veteran and active military on campus enroll in Engineering.
- Principal investigator on a \$2 million grant from the National Science Foundation entitled, The STEP Partnership of San Diego (SPSD), which is now in completed (renewal grant under preparation). The Partnership fosters a regional alliance of educational institutions, industries, and government agencies, to create a pipeline from community college to university in support of San Diego's STEM industries. *SPSD* provides services to economically and/or educationally disadvantaged students to succeed in STEM fields. It is based upon the highly successful MEP Program at SDSU. The academic partners include San Diego State University, San Diego City College, and Southwestern College. The program has received high praises from NSF for its effectiveness. In NSF's most recent review, the strong partnership between the community colleges and SDSU was cited as a true strength.
- Completed planning for a new Engineering complex. Study spaces are designed to promote a contemporary learning environment. As part of the planning process, the College leadership was taken to various campuses in California to observe the best practices in engineering building design. Currently, the project is on hold because of state funding.
- Renovated key laboratories and offices in the engineering complex. Of particular note is the renovation of both the mechanical design shop and the recently completed electrical engineering laboratories.

## MAJOR ACCOMPLISHMENTS

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### UNIVERSITY OF SOUTH ALABAMA

*Founded in 1963, the University of South Alabama (USA) is an urban, comprehensive doctoral/research-intensive university with over 11,000 students and 450 faculty. The University has colleges of Arts and Sciences, Allied Health Professions, Business, Education, Engineering, Medicine, Nursing, and schools of Computer and Information Sciences and Continuing Education.*

#### **Dean, College of Engineering**

Administer all internal and external activities of the College of Engineering, consisting of four departments and five academic programs, each accredited by the Accreditation Board for Engineering and Technology, Inc. (ABET) with over 800 undergraduate and 80 graduate students.

#### **Programs**

- Created a new bachelor-level degree program in Computer Engineering in 1994, which became the second largest in Engineering. Computer Engineering received its initial accreditation in the 1999 ABET review.
- Led the College through two ABET accreditation reviews (1993 and 1999) with 1999 review using ABET's outcomes assessment-based process, Engineering Criteria 2000. USA was the first Engineering College in Alabama to be reviewed and accredited using the EC 2000 criteria.
- Doubled the College's yearly number of graduate degree recipients.

- Received \$150,000 from the CIBA-Specialty Chemicals Corporation to develop graduate-level courses in “Management of Technology”, to improve the business, financial management and soft skills of degree recipients.

### **Outcomes Assessment**

- Developed and published a new “Strategic Plan” for the College using input from all constituencies including faculty, students, alumni, employers, etc.
- Held annual retreats for the College faculty to review accomplishments of the previous year and to establish goals for the upcoming year.
- Established a College of Engineering Industrial Advisory Board (IAB) consisting of over twenty-five top-level executives of companies in Alabama, Mississippi and Florida that employ our graduates.
- Created advisory boards for each academic undergraduate specialization representing industrialists, alumni and students for the continuous improvement of each program.

### **Scholarships**

- Obtained the largest single scholarship endowment for the College of Engineering and one of the largest for the University of South Alabama, \$500,000, from the Alabama Power Foundation. This endowment provides full scholarships (and summer internships) for eight undergraduate students.
- Expanded the number of industrial- and alumni-sponsored scholarships for Engineering. Over twenty scholarships are awarded annually in addition to the University’s general scholarship program.
- Received major funding from the National Science Foundation CSEMS Research Scholarship Program. This program provides forty scholarships of \$3,150 per year per student for juniors, seniors and graduate students in engineering, math and computer science.

### **Diversity**

- Active focus on minority student recruitment. The number of minority students in engineering increased from 11.3% of the total undergraduate student population in Fall 1995 to 19.6% in Fall 1999.
- Created a minority recruitment program in 1994 for 9<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade high school students entitled ACE/USA (Accepting the Challenge to Excel) and funded it with industrial support of \$8,000-10,000 per year. Over 110 high school students participate annually in this bi-weekly after-school program.
- Hosted, in collaboration with the College of Education, the 1995 Annual SECME Summer Teacher Institute on the USA campus. This weeklong institute involved over two hundred K-12 teachers and three hundred high schools students, with a focus of bringing minority students into engineering.

### **Technology**

- Upgraded most engineering classrooms for multimedia.
- Installed wireless internet connectivity for all engineering buildings.
- Increased the use of the “web” for classroom instruction.
- Chaired a university-wide committee to establish policies for approving classes to be offered on-line.

### **Research, Scholarship, and Technology Transfer**

- Increased externally-funded research expenditures from approximately \$150,000 in 1992 to over \$3,000,000 for 2002.
- Received a multi-year \$2,000,000 per year grant from the Department of Energy for developing grid-independent fuel cell-powered home.
- Created several research focus areas including optical computing, environmental engineering, coastal engineering and natural gas processing technology.
- Worked cooperatively with the University and the Mobile Area Chamber of Commerce to create an on-campus technology park for technology business development. A second phase of the park is under construction.
- Actively collaborated with the College of Medicine on several major research initiatives.
- In 2000, the College transferred its first patented technology to an industrial partner for commercial development.
- Substantially increased publications and invention disclosures by faculty in College and supported technology transfer partnerships.

- Developed several multi-university, research collaborations including work with the California State University at Long Beach, the University of Alabama, Alabama A&M University, etc.
- Used the federally-sponsored EPSCoR program to expand research facilities and support. Examples include facilities for the fabrication of electron thin films by laser ablation, Internet II, etc.
- Helped initiate a university-wide “Research Roundtable” to foster interdisciplinary collaborations.
- Initiated a university/K-12 effort to target federal funding opportunities for enhancing local math/science education.

### **Federal Direct Appropriations**

- Secured approximately \$2,500,000 in direct federal appropriations in 2002 for fuel cells and coastal zone research.
- Worked with Alabama’s federal legislative delegation in Mobile and in Washington, DC, to secure direct appropriations for a number of projects including the commercialization of “High-Speed Sealift”, managing beaches and coastal erosion, etc.
- Collaborated with several other universities in Alabama, Louisiana and California on “High-Speed Sealift”, a vessel/port project for both commercial and military applications. The Gulf Coast effort is focused on the commercialization of high-speed shipping.

## **MAJOR ACCOMPLISHMENTS**

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### **CLEVELAND STATE UNIVERSITY**

*Cleveland State University (CSU) is a comprehensive, urban university having, at that time, approximately 17,000 students.*

#### **Chair, Department of Chemical Engineering (1984-1991)**

Administered all internal and external activities of the ABET-accredited Department of Chemical Engineering, with ten full-time faculty.

- Changed the character of the department from one that primarily emphasized teaching to one with a balance of teaching and research.
- Expanded research funding to \$1.2 million annually with contract research from the NASA’s Lewis (now Glenn) Research Center, NSF and industrial support.
- Developed close ties with CSU’s Advanced Manufacturing Center, a focal point for industry/university collaborations.
- Worked directly with faculty and with university facilities planners, architects and construction contractors on the redesign and complete renovation of all classrooms, offices, laboratories, etc. for the Department of Chemical Engineering. The renovation was completed in 1990.
- Established an international co-op program for student exchange with Brunel University in the UK.
- Created a minority recruitment program in partnership with local high schools entitled, ACE, **A**ccepting the **C**hallenge to **E**xcel. This model was adopted college-wide.



## PROFESSIONAL AFFILIATIONS

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- Tau Beta Pi
- Sigma Xi, The Scientific Research Society
- Phi Lambda Epsilon
- 1972 – 1992 American Institute of Chemical Engineering
- 1985 – 1991 Member, Steering Committee, Cleveland State University's Advanced Manufacturing Center (AMC)
- 1992 – Present American Society of Engineering Education
- 1992 – Present ASEE Engineering Deans Council
- 1992 – 2002 State of Alabama Engineering Dean's Council
- 1993 – 2003 Secretary (2001-2002,) Member, Mobile Sunrise Rotary Club, Board of Directors
- 1993 – 1994 Chair, Strategic Planning Committee, United Way of Southwest Alabama
- 1994 – 1998 Vice Chair (1996), Board of Directors, Mobile Area Chamber of Commerce
- 1995 – 2002 Secretary, Board of Directors, Southeast Consortium for Minorities in Engineering (SECME, Inc.)
- 1996 – 2002 Chairman (1999-2000), Board of Directors, GCATT, Gulf Coast Alliance for Technology Transfer
- 1997 – 2002 Board of Directors, Space Science and Technology Alliance (SSTA)
- 2003 – Present Member, Rotary Club of San Diego
- 2004 – 2008 Member, Workforce and Education Committee, San Diego Economic Development Corporation (EDC)
- 2004 – Present Member, Engineering General Contractors Association (EGCA) Foundation Board
- 2005 – Present Board of Directors, CONNECT
- 2005 – Present Member, Board of Governors, Order of the Engineer

## GRANTS

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- **\$2,000,000** – STEP Partnership in San Diego, National Science Foundation, October 1, 2006 to September 30, 2011.
- **\$430,500** – Evaluation of ETS-10 Adsorbents in the Removal of Hydrocarbons from Claus Gas Reactor Feed Street, Engelhard Corporation, 6/15/98—6/15/02.
- **\$279,832** – Evaluation of Engelhard Molecular Sieve Zeolites, D.T. Hayhurst, Engelhard Corporation, Specialty Chemicals Division, 8/15/86—12/31/91.
- **\$270,000** – Inorganic Materials Research, D.B. Shah, D.T. Hayhurst and E.E. Graham, State of Ohio's Academic Challenge Program, 9/15/85—9/14/91.
- **\$208,545** – The Adsorptive Storage of Methane in Molecular Sieve Zeolites, Future Fuels Inc., 6/15/84-6/15/85.
- **\$200,000** – Service Grant, providing internships for veteran students in Engineering, National Science Foundation, October 1, 2010 to September 30, 2011.
- **\$200,000** – Transitioning Troops to Engineers, National Science Foundation, October 1, 2009 to September 30, 2012
- **\$200,000** per year – MESA, San Diego, University of California President's Office, 2003, 2004, 2006-present.
- **\$200,000** per year – MESA, Imperial Valley, University of California President's Office, 2005-present.
- **\$150,000** – Loaned Executive Program, CIBA Specialty Chemicals, 1/1/99—12/31/99.
- **\$127,158** – Parameters Affecting the Crystallization of Silicalite in Microgravity, D.T. Hayhurst, Battelle's Center for the Commercial Development of Space, 7/15/86—9/15/90.

- **\$121,810** – Application of Molecular Gate Technology to Oxygen Enrichment of Air Streams and Simplified Purification of Natural Gas. U.S. Dept. of Commerce ATP Program, subcontract to Engelhard Corp., 10/1/99—7/31/00.
- **\$120,609** – Microsegregation in Directionally Solidifying Binary Alloys, D.T. Hayhurst and S.N. Tewari, NASA Lewis Research Center, 5/25/86—9/15/88.
- **\$103,361** – Removal and Recovery of Ammonia from Off-Gases by Adsorption, D.T. Hayhurst and O. Talu, Materials Engineering Operation, General Electric Corporation, 7/1/90—7/30/91.
- **\$89,912** – Removal-Moderation of Ammonium Concentration in Industrial Waste Water by Ion-Exchange, O. Talu, D.T. Hayhurst and D.B. Shah, Materials Engineering Operation, General Electric Corporation, 12/15/90—6/30/91.
- **\$35,000** – Correlation of Zeolite Acid Site Strength with Catalytic Activity and Selectivity, Department of Energy, Pittsburgh Energy Technology Center, 7/26/82—7/25/83.
- **\$34,543** – Evaluation of Methane Adsorption on Molecular Sieve Carbons, D.T. Hayhurst and O. Talu, Michigan Consolidated Gas Company, Technology Development, 7/15/86—4/1/87.
- **\$20,000** – Zeolite Characterization, The Standard Oil Company (Ohio), 5/1/83—5/184.
- **\$16,000** – Advanced Manufacturing Center Planning and Development, National Science Foundation, 10/1/97—9/30/98.
- **\$8,000 to \$10,000** annually – ACE/USA Program; Support for the USA College of Engineering minority recruitment program, 1994 to 2002.
- **\$4,000** – Advanced Manufacturing Center Planning and Development, Mobile Area Education Foundation, 8/15/97—7/31/98.

## RESEARCH ACTIVITIES

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### Specialty Areas

- Molecular sieve zeolites: synthesis, adsorption, diffusion, catalysis and the use of these materials for industrial pollution control processes.
- Most recently, my zeolite research has focused on the use of these materials for desiccant cooling of chemical and biological suits for the military and for fire-fighters in collaboration with the Navy's research laboratory, NAVAIR in Patuxent, MD.

### Patents

- *The Use of Crystalline Molecular Sieves Containing Charged Octahedral Sites in Removing Volatile Organic Compounds from a Mixture of the Same*, S. Kuznicki, D. Dang, D.T. Hayhurst and K.A. Thrush, U.S. Patent No. 4,346,535 (1994).
- *Crystallization in a High Gravitational Force Field*, D.T. Hayhurst, P.J. Melling and W.J. Kim, U.S. Patent No. 5,093,095 (1992).

### International Research Experiences

- Visiting Research Professor, Universita della Calabria, Cosenza, Italy, eight weeks in the Summer and Fall of 1986 and again in 1987.
- Selected by the National Academy of Sciences as a participant for their Inter-Academy Exchange Program with the Akademie der Wissenschaften der DDR, Zentralinstitute fur Physikalische Chemie, with Dr. Martin Bulow. The exchange was for one month, 5/89—6/89.
- Lectures at over ten universities in mainland China during the period of six weeks, Summer 1985.

## PUBLICATIONS

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### Refereed Journal Articles

1. "Troops to Engineers - Transitioning Military Experience to a Career in Engineering" D. T. Hayhurst, A. Lighthart and D. Johnson, *Frontiers in Education*, Annual Conference, October 2010.
2. "Fabrication of Functionally-Graded Zeolites by Electrophoretic Deposition," X. Wang, E.A. Olevsky, E. Bruce, M.B. Stern and D.T. Hayhurst, *Surface Engineering*, vol. 23, issue 6, 443-447 (2007).
3. "Study on the rapid crystallization of ETS-4 and ETS-10", W.J. Kim, M.C. Lee, J.C. Yoo and D.T. Hayhurst. *Microporous and Mesoporous Materials*, vol. 41, no. 1-3, pp. 79-88 (2000).
4. "Synthesis of hydro-thermally stable MCM-41 with initial adjustment of pH and direct addition of NaF", W.J. Kim, J.C. Yoo, D.T. Hayhurst. *Microporous and Mesoporous Materials*, vol. 39, no. 1, pp. 177-186 (2000).
5. "Synthesis of ZSM-5 at a low temperature and atmospheric pressure in a pilot-scale batch reactor", W.J. Kim, M.C. Lee, and D.T. Hayhurst. *Microporous and Mesoporous Materials*, vol. 26, no. 1-3, pp. 133-141 (1998).
6. "Studies of the Crystallization of ZSM-5 under High Gravitational Force Field", W.J. Kim, D.T. Hayhurst, S.A. Lee, M.C. Lee, C.W. Lim and J.C. Yoo. *Studies in Surface Science and Catalysis*, vol. 105A, Progress in Zeolite and Microporous Materials, pt. A., pp. 157-174 (1997).
7. "Intracrystalline Diffusion of Benzene in Silicate: The Effect of Structural Heterogeneity", D.B. Shah, C.J. Guo and D.T. Hayhurst. *Journal of the Chemical Society, Faraday Transactions*, vol. 91, no. 7, pp. 1143-1146 (1995).
8. "Synthesis of titanium molecular sieve ETS-10 and ETS-4", Alfonso Nastro, D.T. Hayhurst and S.M. Kuznicki. *Studies in Surface Science and Catalysis*, vol. 98, Zeolite Science 1994: Recent Progress and Discussions, pp. 22-23 (1995).
9. "Measurement of Transport Rates of C<sub>4</sub> Hydrocarbons Across a Single Crystal Silicalite Membrane", D.B. Shah, S. Chokchai-acha and D.T. Hayhurst. *Journal of the Chemical Society, Faraday Transactions*, vol. 89, no. 16, pp. 3161-3167 (1993).
10. "Effect of Structural Heterogeneity: Diffusion of Aromatic Hydrocarbons in Large Crystals of Silicalite", D.B. Shah, C.J. Guo and D.T. Hayhurst, *Proc. 4<sup>th</sup> Int. Conf. on Fundamentals of Adsorption*, Ed. M. Suziuki, Kodansha, Japan, pp. 575-582 (1993).
11. "Synthesis and Adsorptive Properties of Titanium Silicate Molecular Sieves", S.M. Kuznicki, K.A. Thrush, F.M. Allen, S.M. Levine, M.M. Hamil, D.T. Hayhurst and M. Mansour. Synthesis of Microporous Materials, M. Occelli and H. Robson (Editors), Chapter 29, Van Nostrand Reinhold, pp. 427-453 (1993).
12. "Effect of Cations on Methane Adsorption by NaY, CaY, SrY and BaY Zeolites", O. Talu, S. Zhang and D.T. Hayhurst, *Journal of Physical Chemistry*, vol. 97, no. 49, pp. 12894-12898 (1993).
13. "High-Silica Zeolite Synthesis in Aqueous and Non-Aqueous Mixed Solvents", A. Nastro, D.T. Hayhurst, F. Crea and R. Aiello, Atti 1<sup>o</sup> Convegno Nazionale Di Scienza E Tecnologia Delle Zeolite, C. Colella (Editor), pp. 23-28 (1991).
14. "Effect of Crystal Size on Sorption and Diffusion of Benzene in HZSM-5 and Silicalite Crystals", D.B. Shah, D.T. Hayhurst, G. Evanania and C.J. Guo, Fundamentals of Adsorption, A.B. Mersman, S.E. School (Editors), pp. 805-814 (1991).
15. "The Effect of Molecular Structure on Heterogeneity and Surface Phase Transition", O. Talu, D.T. Hayhurst and C.J. Guo, Fundamentals of Adsorption, A.B. Mersman, S.E. School (Editors), pp. 899-908 (1991).
16. "High Pressure Adsorption of Methane on Alkaline-Earth Exchanged Zeolite X", S. Zhang, O. Talu and D.T. Hayhurst, *Journal of Physical Chemistry*, vol. 45, no. 4, pp. 1722-1726 (1991).
17. "Chemical Factors Influencing the Growth of Large ZSM-5 Crystals", D.T. Hayhurst, G. Evanania and F. Huang, *Polish Journal of Chemistry*, vol. 64, pp. 295-303 (1990).
18. "Heterogeneous Adsorption Equilibria with Comparable Size Molecule and Pore Sizes", O. Talu, C.J. Guo and D.T. Hayhurst, *Journal of Physical Chemistry*, vol. 93/21, pp. 7294-17298 (1989).
19. "The Effects of Varying the Tetraalkylammonium Template on High Silica Zeolite Synthesis", A. Nastro,

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## **OTHER ACTIVITIES**

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- Hosted exchange faculty on sabbatical leaves from universities in Italy, Germany, Canada and Korea.
- My wife, Mari, and I raise and show AKC champion Great Danes, Rottweilers and Whippets. We are both AKC-approved judges for Great Danes, Doberman Pinschers, Boxers, Rottweilers, Anatolian Shepherds, Bullmastiffs, Mastiffs and Newfoundlands.
- For recreation, I enjoy college and professional sports, especially football, as well as playing golf.