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Dear Friends and Colleagues:
The past year at NC State University has been filled with exciting challenges and many outstanding accomplishments. This Annual Report details our activities in research, education, and outreach. We hope you find it informative.

Faculty News
The H. Clark Chair in Chemical Engineering was advertised at the national and international level and we received many outstanding applicants. We are extremely happy to report Prof. Keith Gubbins of Cornell University’s Chemical Engineering Department has accepted the position. He is a member of the National Academy of Engineering and one of the most respected academics in Chemical Engineering in the world. His area of expertise is statistical mechanics as applied to polymeric and nanomaterials.

Last fiscal year (1995-1996), Professor Joseph M. DeSimone of the Department of Chemistry at the University of Chapel Hill established a joint appointment in our department, primarily to develop his research and teaching interests in applied physical and polymer chemistry. Joe is world-renowned for his innovative research in polymer synthesis in compressed carbon dioxide, as well as his many studies in applied physical and polymer chemistry. This past year, Joe and I established The Kenan Center for the Utilization of CO₂ in Manufacturing. The center was initiated with support from 20 chemical and manufacturing companies and should rapidly become a focal point of innovative applied research in the Department.

Negotiations were completed with Materials Science and Engineering to satisfy Dr. Richard Spontak’s request to eventually have his appointment end up as 75% ChE and 25% MTE in the academic year 1998-99. The process will begin with a 40% ChE and 60% MTE appointment in the 1997-98 academic year. Prof. Spontak is a world-renowned expert in probing the microstructure of polymeric and colloidal materials, and many of his morphological studies have been showcased on the covers of Langmuir and the Journal of Materials Science.

Prof. Saad Khan, an expert in rheology with particular emphasis on polymeric and colloidal systems, was promoted to Associate Professor with tenure.

Three temporary faculty were hired to help with our teaching load (Dennis Drehmel, Gary Gilleskie, and Eduardo Saez). Funds from a vacant faculty position (Bob Thorogood) were used to cover these additional expenses. These faculty have helped by teaching two sections of a number of the larger courses in the department, and by advising student groups in the design and laboratory courses so that the students get more personalized treatment. The need for this has arisen because of the large number of undergraduate students in our junior and senior courses.

The leadership in the Chemical Engineering Department was reorganized by the establishment of two Associate Department Head positions. Peter K. Kilpatrick was made responsible for Undergraduate affairs, and Benny D. Freeman was placed in charge of development (infrastructure, awards). One of the major outcomes of this reorganization has been a much-larger number of awards won by our faculty this year, which we feel will be an important factor in the determination of department rankings in the future. Peter Kilpatrick has also developed a format for the departmental annual report which will help facilitate the production of this material on a yearly basis from now on.

Undergraduate Education
The undergraduate students in Chemical Engineering, under the auspices of the AIChe student chapter, organized a satisfaction survey to identify areas that need improvement in ChE. One of the major complaints was with the adequacy and accessibility of computers that are used for design calculations in several courses. With the help of Educational Technology Fee funds, several new computers were purchased to help replace and supplement those available now in the Eos laboratory in Riddick. Computers were also purchased for the Unit Operations Laboratory, and the addition of state-of-the-art process control equipment in that laboratory continues, with the help of the Reichhold Chemical Co. and Johnson/Yokogawa. Three new Macintosh computers were purchased for the use of first year graduate students, and these were installed in Riddick 10A.

The department continues to support the COE in the development of lower-division courses, in particular, E497H (Rich Felder) and E123 (Dave Ollis). This academic year the ChE Department awarded 134 BS degrees, 9 MS degrees (thesis only) and 9 PhD degrees. This is a record number of BS graduates, and a record number of graduate degrees all in one year. There were 5 valedictorians in the ChE graduating class, out of a total of 24 in the university as a whole.

The Student Chapter of the AIChe was the host for this year’s Southern Regional AIChe Student Chapter Conference, held in Charlotte, NC, April 3-5, 1997. This provided a wonderful showcase for our program in front of some of the best undergraduate students in the country. Our undergraduate AIChe student chapter was recognized for the second year running with a National Award of Excellence. In addition, the Advisor of the AIChe
Student Chapter, Professor George Roberts, was named Outstanding AIChE Student Chapter Advisor for 1996-1997, a well-deserved recognition of George’s dedication to our students.

Graduate Education
The graduate student committee ran its own survey on graduate student satisfaction in order to let the faculty know potential areas of concern regarding the graduate program. The graduate students in ChE play a very active role in the running of the department, meeting with the department head several times a year to voice concerns and ask questions about departmental directions. The graduate students are also key players in the recruitment of new graduate students each year. They handle prospective graduate student schedules, give them tours of Raleigh and the NC State campus, and do all of the entertaining over a two-day (sometimes three-day) period. Because of their efforts, this year we had a very good recruiting year. We will have 20 new graduate students with excellent GPAs (3.7 average) as well as average verbal and math GRE scores in the mid-700s. Nineteen of these students received BS degrees from other institutions (a sign of quality among ChE graduate programs), and were actively recruited by some of the best programs in the nation. Preliminary reports indicate we did much better in recruiting this year than many other departments with a higher 1995 National Research Council ranking.

Departmental Infrastructure
Research laboratories in Riddick were improved by the use of indirect costs returns to the department and help from both the Dean’s office and the office of the Vice Chancellor for Research. Greg Parson’s laboratory was outfitted with new benches ($29,000) and Benny Freeman’s laboratory received two new hoods ($45,000).

The duties and responsibilities of the Instrument Maker and Building Liaison were reorganized to provide a more efficient operation. They now report to one of the Associate Department Heads (Benny Freeman) who is monitoring their progress.

Extension
The Chemical Engineering Department helped to restart the local chapter of the American Institute of Chemical Engineers, which had been inactive for the last two or three years. We have agreed to provide facilities for meetings, speakers, and whatever else the chapter needs to become a going concern. This will be for the long-term benefit of our students and our programs. The ChE Department participated in the COE Open House, as well as in the Spend-A-Day program to help increase COE enrollment.

An excellent issue of the Alumni Newsletter was produced by Hubert Winston and mailed out in the spring. This was our largest issue ever, and it has resulted in a good response from alumni. This is an effort that needs to be maintained in order to keep the alumni involved with the department.

We continue to have an active Alumni Industrial Advisory Board that helps guide the department with industry-university interactions. Two meetings were held this year, one during Tailgate weekend in the fall, and one in the spring. The Board is proud that the fall meeting coincided with the arrival of Fran (the Hurricane) - but they met! Even though the care and feeding of the Board is time-consuming, the effort and cost has more than paid for itself already in terms of contributions to our program.

Visits were made to BASF, Cryovac and to Eastman Chemical to discuss potential large corporate and alumni gifts to the Riddick Renovation.

An agreement was reached to hire a part-time Development Officer that will help the department generate funds for renovation as well as scholarships. This position will be shared with the ECE department and the College of Engineering.

Overall, our year was filled with accomplishments and steady progress towards our goal of becoming a top-ranked Chemical Engineering Department at the National level. We continue to strive to upgrade the quality and productivity of our faculty, students, infrastructure, and physical resources. The assistance of our industrial partners, advisory board, and academic colleagues has been invaluable and the coming year promises to bring even more significant strides forward. I hope you find this report on our Department useful.

Ruben G. Carbonell
Hoechst-Celanese Professor and Head
Undergraduate Program

Trends in Undergraduate Enrollment

Trends in B.S. Degrees Granted
B.S. Degree Recipients

There were 134 Bachelor of Science degrees awarded during the year.

August 1996 Graduates
Shannon K. Cox

December 1996 Graduates
Robert L. Andrews
James E. Cawthorne
Angela D. Hall
Seung Y. Lee
Sue A. Quick
Timothy L. Schleining

Steven C. Bacon
Azelia C. Edwards
Jon R. Jackson
Jess V. Nauman
Melissa C. Ricks
Son N. Tran

Kendra K. Batley
Christel L. Graham
Phillip T. Jordan
Wesley B. Petrea
James E. Ringelspaugh
Robert C. Yang

May 1997 Graduates
Amit Aggarwal
Jonathan R. Beauchamp
Bethany A. Bolt
Richard Broadhurst
Rochelle H. Carlton
Esther Chong
David T. Coker
Geoffrey G. Deichert
Teshma D. Drnasky
Peter J. Erikson
Timothy D. Formes
Garland W. Fussell
Julie A. George
Niambe K. Green
Allison A. Hardy
John M. Hedgpeth
Wade M. Hubbard
Henry S. Hu
Thomas M. Jenn
Aparna Kamath
Nathaniel M. Ledford
Julie S. Lovelace
Robert M. Marshburn
Francis J. McGowan
Heather A. Minor
Malika Narasimha
Valerie I. Pai
Daniel K. Peplinski
Robert C. Perry
Donald W. Pulliam
Chester L. Rowe
Angie M. Shepherd
Kenneth L. Smith
Kelly M. Tinga
Thuan T. Tran
John F. Wade
Brian L. Watson
Benjamin A. Wilhite
Stephen K. Yuen

Timothy M. Anderson
Richard E. Beckham
Ryan D. Bradley
Heather J. Burgess
Brian D. Caveness
Sharon A. Chung
Kimberly R. Collie
Katherine P. Dietrich
Erika D. Dywan
Michael J. Fea
Krista D. Frisby
Sumit Gangwal
Thomas M. Georgoulas
Jason E. Greenwood
David B. Harris
Jennifer L. Hinson
Aaron L. Hughes
Veronica J. Huneycutt
James K. Jones
Mark D. Lail
Brian G. Lockamom
Robin R. Lowery
Stacey H. Martin
Mark A. McNeill
Mitchell
Mark E. Newsome
See H. Park
Brent C. Perry
Stephen R. Peterson
Sharon M. Rochelle
Angela S. Russell
Karen R. Shigebara
Alan B. Stamey
Rebecca L. Tough
Laura L. Venters
Melanie S. Wall
Christopher C. Watson
Crystal D. Williams

Nancy E. Baum
Matthew C. Bobo
Michael E. Brady
Juan C. Bustamante
John F. Chambard
David L. Clemmons
Gregory N. Corder
Valerie L. Dippery
Stephen J. Ellis
Bradley C. Flynn
William J. Fritsch
Jeffrey S. George
Joseph L. Graham
William W. Greer
Andrew P. Head
Tyson L. Holt
Robert G. Hughes
Nakia L. Isler
Wuchieh J. Jong
William T. Leach
David K. Loughlin
Benjamin J. Lukowski
Phillip W. McCarter
Hugh L. Medford
Jennifer C. Morgan
Christopher Y. Norwood
Rachael K. Parker
Jonathan I. Perry
James P. Pregler
Davida A. Rogers
Dawn M. Scott
Erik S. Shore
Valerie R. Stroup
Nhusuong N. Tran
Raman K. Vidyarthi
Chancey B. Washburn
Rodney W. Webb
Dana H. Williams

1 Double majors
** Magna Cum Laude
S University Scholars Program
Cum Laude
*** Summa Cum Laude
Undergraduate Scholarships and Awards

Scholarships - 1996-1997

Benjamin Franklin Scholarship
Amanda P. Langenbach
Donald W. Pulliam
James W. Taylor

Charles S. Mitchell Memorial
Andrea L. Asdel

Caldwell Scholar
Sharon E. Chung
Malika Narasimha

College of Engineering Alumni Loyalty Scholarship
James R. Cauley
Lauren B. Edwards
Peter J. Erikson
Garland W. Fussell
Joseph T. Marranca
Heather A. Minor
Andrew P. Rutherford

College of Engineering Senior Humanities
Donald W. Pulliam

Eastman Scholars Program
Ryan D. Bradley

Henry B. and Virginia T. Smith Scholarship
Wuchieh J. Jong

Hoechst Celanese Scholarship
Kevin A. Chamness
Dave Eichman

KATHERINE STINSON SCHOLARSHIP
Holly Darlene M. Pollock

Michael B. Christie Scholarship
Melodie J. Vines

National Association of Corrosion Engineers
Bradley P. Cozart

National Starch and Chemical Company
Christopher B. Arthur
Hien Dang
Joy L. Douglas

Procter & Gamble Scholarship
Tylisha M. Barber
Anthony T. Baker
Dalila A. Butler
Michael B. Gregory
Atiya N. Moses
Arthur E. Peoples

Russ O’Dell Outstanding Senior
David K. Loughlin

Robert and Elizabeth White Carson
Lara L. Venters

RTI-Forest Mixon Scholarship
Clarence A. Arnold
Bradley P. Cozart

Sidney F. Mauney, Jr. Memorial Scholarship
James W. Taylor

United Technologies Minority Scholarship
Dalila A. Butler
Quynh N. Tran
Student Organizations and Recognition

College of Engineering Senior Awards - Spring 1997

Humanities: Donald Pulliam

AIChE Student Chapter

Officers: 1996-1997

President: John Chambard
Vice-President: Henry Hui
Corresponding Secretary: Brian Caveness
Treasurer: Bethany Bolt
Recording Secretary: Julie George
Programs Chairpersons: Jacquelyn Bright, Smitesh Shah, Wendy Taylor

Chapter Advisor: Dr. George W. Roberts

Won a National AIChE Award of Excellence

Fall 1997 AIChE Student Chapter Officers

President: Steven Maygar
Vice-President: Jacqueline Mullen
Corresponding Secretary: Bradley Cozart
Treasurer: Joey Baker
Recording Secretary: Ketan Vaidya

Chapter Advisor: Dr. George W. Roberts

Won a National AIChE Award of Excellence

Dr. George Roberts won National Student Chapter Advisor of the Year Award

Activities of AIChE Student Chapter

• Record Membership of 260 students.
• Company-sponsored luncheons, fall and spring
• Forty-three students attended the national meeting in Chicago. (November, 1996)
• Hosted the Southern Regional Conference in Charlotte.
• Fifty students attended the Southern Regional students chapter convention in Charlotte (April, 1997)
• Mentoring Program was expanded to include a broader range of students, both full time & Co-op/Intern Positions
• Hosted job search forum to aide students in job search skills
• Developed a powerful website for easy access

Awards were presented for papers:
Timothy Anderson 2nd place

ISPE Student Chapter

Officers: 1996-1997

President: James Jong
Vice-President: Jess Nauman
Secretary: Mike Brady
Treasurer: Lara Venters
Industry Advisors: Dan Dunbar-Glaxo Wellcome, James Brown-Ajinomoto

Chapter Advisor: Dr. Steve Peretti

Fall 1997 Student Chapter Officers

President: Kathie Moell
Vice-President: Mike Prazma
Secretary: Chris Wood
Treasurer: Matt Pollock

Chapter Advisor: Dr. Steve Peretti

Activities of ISPE Student Chapter

• Membership of 23 students
• Company sponsored luncheons, fall and spring
• Organized several plant trips
• Completion of resume book for graduating seniors as well as students interested in internships.

Graduating Class Data - 1996-1997

Statistics

B.S. Che 134
COOP Program 36
2nd Degree
(Pulp & Paper Technology) 15
(Textile Chemistry) 2
(Chemistry) 9
(Biochemistry) 2

Students known to be going to Graduate School 7
Cooperative Education Program

A sound curriculum which combines theoretical and practical training in chemical engineering principles and design coupled with professional work experience are the bases of NC State’s Cooperative Education Program. The Cooperative Education Program at NC State provides outstanding undergraduates with terms of full-time study interspersed with up to five semesters and summer sessions of full-time engineering-related employment. During the past year, 32 chemical engineering majors participated in the Co-op program. The students are full-time employees of the sponsoring company during their terms of work. During 1996-97, the average monthly salary for Co-op students working as chemical engineers was $2,204. A high percentage of Co-op students receive offers of professional employment after graduation. Approximately 200 employers in North Carolina and throughout the nation participate in the Co-op program, thus providing a good cross-section of opportunities for industrial experience. Those who provided employment to our department’s students this past year are listed below, followed by the names of the students involved.

Allied Signal
    Kenieth L. Smith

Boehme Filatex
    Mathew Bobo

Bonset
    Seung Yong Lee

Chesapeake
    Alan B. Stamey
    Nhusuong N. Tran

DuPont
    Gregory N. Corder
    Wu-Chieh James Jong

Eastman Chemical
    William J. Fritsch

EMS
    Sea H. Park

Glaxo Wellcome
    Esther Chong
    Robert G. Hughes
    James K. Jones
    Phillip W. McCarter
    Francis J. McGowan
    Heather A. Minor
    Jess J. Nauman
    Mark E. Newsome
    Nicole K. Oliver
    James M. Reynolds
    Valerie R. Stroup
    Thuan T. Tran

Hoechst Celanese
    Henry S. Hui
    Corneli E. Mitchell

Lederle Praxis
    Stacey M. Hill

Motorola
    Krista D. Frisby

Milliken
    Timothy M. Anderson

Mitsubishi
    Melanie S. Wall

National Starch & Chemical
    Brian D. Caveness
    Erik S. Shore

NC Dot
    William D. Greer

Square D
    Jonathan Beachamp

Williamette
    Juan C. Bustamante
    Andrew P. Head
## Career Placement

Organizations Recruiting our B.S. Graduates

<table>
<thead>
<tr>
<th>Employer</th>
<th>Employer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbott Labs</td>
<td>Kimberly Clark Corporation</td>
</tr>
<tr>
<td>Armstrong World Industries</td>
<td>Libby-Owens-Ford</td>
</tr>
<tr>
<td>Ashland Chemical Company</td>
<td>Merck &amp; Company</td>
</tr>
<tr>
<td>BASF</td>
<td>Milliken</td>
</tr>
<tr>
<td>BOC Process Plants</td>
<td>Motorola</td>
</tr>
<tr>
<td>Bridgestone/Firestone</td>
<td>National Starch &amp; Chemical</td>
</tr>
<tr>
<td>Champion International Corporation</td>
<td>Price Waterhouse</td>
</tr>
<tr>
<td>Corning</td>
<td>Proctor &amp; Gamble</td>
</tr>
<tr>
<td>Collins &amp; Aikman</td>
<td>Research Triangle Institute</td>
</tr>
<tr>
<td>Eastman Chemical</td>
<td>RJ Reynolds</td>
</tr>
<tr>
<td>Englehard Corporation</td>
<td>Rohm and Haas</td>
</tr>
<tr>
<td>Exxon</td>
<td>Siecor Corporation</td>
</tr>
<tr>
<td>Hercules, Inc.</td>
<td>Temple Inland</td>
</tr>
<tr>
<td>Hoechst Celanese</td>
<td>Underwriter's Lab</td>
</tr>
<tr>
<td>Huber Engineered Minerals</td>
<td>Unifi, Incorporated</td>
</tr>
<tr>
<td>IBM</td>
<td>Westinghouse Bettis Atomic Lab</td>
</tr>
<tr>
<td>ICI</td>
<td>Westvaco</td>
</tr>
<tr>
<td>Intel Corporation</td>
<td>3V Chemical Company</td>
</tr>
</tbody>
</table>
The graduate program consists of both formal (classroom) educational activities and a research experience.

**Graduate Student Enrollment**
- **Fall 1996**

**Statistics**

- M.S. Candidates: 23
- Ph.D. Candidates: 62
- Total: 85
- Men: 57
- Women: 28
- Total: 85
- U.S. Citizens: 60
- Foreign: 25
- Total: 85

Of the U.S. citizens, there are 6 minority students, as follows: 3 African Americans, 2 Asian and Indian, and 1 Hispanic.

The foreign students come from 10 countries, as given below: 12 India, 4 France, 1 P.R. China, Brazil, Liberia, Taiwan, Korea, Bangladesh, Venezuela, Mexico.
<table>
<thead>
<tr>
<th>Student</th>
<th>Major Professor</th>
<th>Undergraduate School</th>
<th>Matriculated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arnold, Michelle</td>
<td>Freeman</td>
<td>MIT - Cambridge, MA</td>
<td>Fall 1993</td>
</tr>
<tr>
<td>Aurand, Gary</td>
<td>Lamb</td>
<td>University of Nebraska</td>
<td>Fall 1988</td>
</tr>
<tr>
<td>Bandlish, Rockey</td>
<td>Kelly</td>
<td>Ohio State</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Barrows, Lisa</td>
<td>Carbonell</td>
<td>University of California - Riverside</td>
<td>Spr. 1997</td>
</tr>
<tr>
<td>Basteck, Patrick</td>
<td>Carbonell</td>
<td>University of Virginia</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Bauer, Michael</td>
<td>Kelly</td>
<td>Cornell University</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Beaudoin, Diane</td>
<td>Peretti</td>
<td>University of Texas - Austin</td>
<td>Fall 1990</td>
</tr>
<tr>
<td>Bhatt, Chinmay</td>
<td>Khan</td>
<td>Birla - India</td>
<td>Fall 1995</td>
</tr>
<tr>
<td>Biales, Joan</td>
<td>Kilpatrick/Roberts</td>
<td>Washington University</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Briant, Yannick</td>
<td>Ollis</td>
<td>Compiegne</td>
<td>Fall 1995</td>
</tr>
<tr>
<td>Chambers, James</td>
<td>Parsons</td>
<td>New Mexico</td>
<td>Fall 1995</td>
</tr>
<tr>
<td>Chen, Li Ang</td>
<td>Carbonell</td>
<td>University of Sao Paulo</td>
<td>Fall 1992</td>
</tr>
<tr>
<td>Chen, Eric</td>
<td>Lamb</td>
<td>NTU</td>
<td>Fall 1995</td>
</tr>
<tr>
<td>Chilukuri, Ravi Kiran</td>
<td>Lamb</td>
<td>I.I.T. - New Delhi</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Chiou, Bor-Sen</td>
<td>Khan</td>
<td>Cornell University</td>
<td>Fall 1993</td>
</tr>
<tr>
<td>Chowdhury, Ashfaqul</td>
<td>Parsons</td>
<td>Bangladesh Univ.</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Colberg, Monica</td>
<td>Grant</td>
<td>Georgia Inst. of Tech.</td>
<td>Fall 1994</td>
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<tr>
<td>Cook, William</td>
<td>Ollis</td>
<td>Univ. of Florida</td>
<td>Fall 1995</td>
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<tr>
<td>Courtney, Clay</td>
<td>Lamb</td>
<td>University of Minnesota</td>
<td>Fall 1993</td>
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<tr>
<td>D’Hennezel, Olga</td>
<td>Ollis</td>
<td>UTC, France</td>
<td>Spr. 1995</td>
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<tr>
<td>Daugherty, David</td>
<td>Felder</td>
<td>West Virginia University</td>
<td>Fall 1987</td>
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<tr>
<td>Dixon, Sabrina</td>
<td>Freeman</td>
<td>USC</td>
<td>Spr. 1996</td>
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<tr>
<td>Driskill, Lance</td>
<td>Kelly</td>
<td>Louisiana Tech.</td>
<td>Fall 1995</td>
</tr>
<tr>
<td>Dudek, David</td>
<td>Fedkiw</td>
<td>University of Illinois</td>
<td>Fall 1993</td>
</tr>
<tr>
<td>Frankel, Kevin</td>
<td>Roberts/Spivey</td>
<td>Manhattan College</td>
<td>Fall 1992</td>
</tr>
<tr>
<td>Gao, Jun</td>
<td>Kelly</td>
<td>University of Florida</td>
<td>Fall 1996</td>
</tr>
<tr>
<td>Gaynor, Gavin</td>
<td>Hall</td>
<td>NCSU</td>
<td>Fall 1988</td>
</tr>
<tr>
<td>Goodall, Jennifer</td>
<td>Peretti</td>
<td>Va Polytechnic Institute</td>
<td>Fall 1992</td>
</tr>
<tr>
<td>Gulati, Harpreet</td>
<td>Hall</td>
<td>I.I.T. - New Delhi</td>
<td>Fall 1991</td>
</tr>
<tr>
<td>Gupta, Atul</td>
<td>Parsons</td>
<td>I.I.T. - New Delhi</td>
<td>Fall 1996</td>
</tr>
<tr>
<td>Gupta, Prashant</td>
<td>Hall</td>
<td>I.I.T. - Bombay</td>
<td>Fall 1989</td>
</tr>
<tr>
<td>Han, Chae</td>
<td>Kelly</td>
<td>Univ. of Texas - Austin</td>
<td>Fall 1993</td>
</tr>
<tr>
<td>Henon, Florence</td>
<td>Carbonell/DeSimone</td>
<td>UTC, Compiegne</td>
<td>Fall 1993</td>
</tr>
<tr>
<td>Hess, Michael</td>
<td>Kelly</td>
<td>Grove City College</td>
<td>Fall 1991</td>
</tr>
<tr>
<td>Hicks, Michael</td>
<td>Fedkiw</td>
<td>University of Dayton</td>
<td>Fall 1993</td>
</tr>
<tr>
<td>Hicks, Paula</td>
<td>Kelly</td>
<td>University of Dayton</td>
<td>Fall 1994</td>
</tr>
<tr>
<td>Hitchcock, Monica</td>
<td>Hall</td>
<td>Syracuse Univ.</td>
<td>Spr. 1994</td>
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<tr>
<td>Hogan, Erik</td>
<td>Desimone</td>
<td>Univ. of Colorado</td>
<td>Fall 1996</td>
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<td>Huang, Kaihong</td>
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<td>Beijing Polytechnic</td>
<td>Fall 1993</td>
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<tr>
<td>Jimenez-Gonzalez, Concepcion</td>
<td>Overcash</td>
<td>Tech. Inst. of Chihuahua</td>
<td>Fall 1996</td>
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<td>Kabin, Jeffrey</td>
<td>Grant/Carbonell</td>
<td>Univ. of Delaware</td>
<td>Fall 1994</td>
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<td>Kaufman, Deborah</td>
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<td>Fall 1994</td>
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<td>Kenkare, Nirupama</td>
<td>Hall/Khan</td>
<td>I.I.T. - Bombay, India</td>
<td>Fall 1992</td>
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<td>Klein, Tonya</td>
<td>Parsons</td>
<td>Univ. of Florida</td>
<td>Fall 1994</td>
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<td>Kozup, Steve</td>
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<td>University of Michigan</td>
<td>Fall 1995</td>
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<tr>
<td>Ledger, Kevin</td>
<td>Hall</td>
<td>Johns Hopkins Univ.</td>
<td>Fall 1994</td>
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<tr>
<td>Student</td>
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<tr>
<td>Lewandoski, Michael</td>
<td>Ollis</td>
<td>Rensselaer Polytechnic Institute</td>
<td>Fall 1996</td>
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<tr>
<td>Littlejohn, Felicia</td>
<td>Grant</td>
<td>Clemson Univ.</td>
<td>Spr.1994</td>
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<tr>
<td>Lydiard, Debra</td>
<td>Hall/Khan</td>
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<td>Fall 1996</td>
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<td>Makosiej, Christopher</td>
<td>Parsons</td>
<td>Clemson University</td>
<td>Fall 1996</td>
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<td>Marquez, Marco</td>
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<td>Fall 1994</td>
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<td>McCormick, Julie</td>
<td>Hall/Khan</td>
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<td>Fall 1995</td>
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<td>McDowell, Christopher</td>
<td>Freeman</td>
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<td>Fall 1992</td>
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<tr>
<td>McLean, Joseph D.</td>
<td>Kilpatrick</td>
<td>University of Arkansas</td>
<td>Fall 1991</td>
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<tr>
<td>Merkel, Timothy</td>
<td>Freeman</td>
<td>Brooklyn Polytechnic</td>
<td>Fall 1996</td>
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<td>Michel, Amy</td>
<td>Lamb</td>
<td>Ohio Northern</td>
<td>Fall 1996</td>
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<tr>
<td>Miller, Edward</td>
<td>Peretti</td>
<td>Univ. of Akron</td>
<td>Fall 1993</td>
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<td>Musser, Barbara</td>
<td>Kilpatrick</td>
<td>Univ. of Houston</td>
<td>Fall 1993</td>
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<td>Norman, Carnley</td>
<td>Lim</td>
<td>Georgia Tech.</td>
<td>Fall 1994</td>
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<td>Nouel, Karine</td>
<td>Fedkiw</td>
<td>UTC, Compieneg</td>
<td>Spr. 1995</td>
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<td>Pai, Vandita</td>
<td>Khan</td>
<td>Bombay - U.D.C.T.</td>
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<td>Raghavan, Srinivasa</td>
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<td>I.I.T. - Madras, India</td>
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<td>Raney, Sonya</td>
<td>Roberts</td>
<td>Auburn University</td>
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<td>Read, Walter</td>
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<td>Fall 1993</td>
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<td>Reifsnyder, Scott</td>
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<td>Fall 1991</td>
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<td>Riley, Michael</td>
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<td>Fall 1995</td>
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<td>Rinker, Kristina</td>
<td>Kelly</td>
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<td>Fall 1992</td>
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<td>Rollins, Kimberly</td>
<td>Kelly</td>
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<td>Fall 1994</td>
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<td>Royer, Joseph</td>
<td>DeSimone/Khan</td>
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<td>Fall 1995</td>
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<td>Scott, Jon</td>
<td>Ollis</td>
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<td>Fall 1991</td>
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<td>Serad, George</td>
<td>Freeman</td>
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<td>Fall 1995</td>
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<td>Shay, Jennifer</td>
<td>Khan</td>
<td>NCSU</td>
<td>Fall 1995</td>
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<td>Shen, Hsin-Chin</td>
<td>Freeman</td>
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<td>Spr. 1993</td>
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<td>Sherrard, Diane</td>
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<td>Fall 1994</td>
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<td>Shreiber, Eric</td>
<td>Roberts</td>
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<td>Singh, Anurag</td>
<td>Freeman</td>
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<td>Fall 1992</td>
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<td>Smith, Bradley</td>
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<td>University of Virginia</td>
<td>Fall 1995</td>
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<td>Spiecker, P. Matthew</td>
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<td>Srinivasan, Easwar</td>
<td>Parsons</td>
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<td>Sullivan, Andrew</td>
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<td>Sunderrajan, Suresh</td>
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<td>Toy, Lora</td>
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<td>Univ. California, Berkeley</td>
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<td>Voegler, Anne</td>
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<td>Villanova</td>
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<td>Walls, Howard</td>
<td>Peretti</td>
<td>Univ. of Colorado, Boulder</td>
<td>Spr. 1995</td>
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<td>Young, Nicholas</td>
<td>Bachmann</td>
<td>Univ. of Massachusetts</td>
<td>Fall 1996</td>
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</table>
Graduate Degree Recipients 1996-97

Master of Chemical Engineering (M.Ch.E.) Degree
May 1997
William L. Cook
Photocatalytic Oxidation of Volatile Organic Compounds in Air at Above Ambient Temperatures (D. F. Ollis)
B.S., University of Florida
Eastman Chemical, Kingsport, TN

Sonya M. Raney
Thermodynamic Evaluation of Heat Integrated Distillation Columns in Low Purity Oxygen Production (G. W. Roberts and W. Thorogood)
B.S., Auburn University
Corning, Wilmington, NC

Master of Science (M.S.) Degrees
July 1996
Marco A. Marquez
The Stability of Liquids and the Effect of Their Composition on the Production of Methanol in a Slurry Reactor (G. W. Roberts)
B.S., Universite Metropolitana
INTEVEP, Caracas, Venezuela

Monica T. Colberg
Hydration of Phospholipid Films in Aqueous Environments (C. S. Grant)
B.S., Georgia Institute of Technology

Karine M. Nouel
Nafion R Composite Polymer Electrolyte Membranes for Use in Fuel Cells (P. S. Fedkiw)
B.S., UTC-Compiegne, France

Doctor of Philosophy (Ph.D.) Degrees
December 1996
Gary A. Aurand
Deposition of SiO2 and GeO2 Films by Rapid Expansion from Supercritical Solution (RESS) (H. H. Lamb)
B.S., University of Nebraska
Instructor in Chemical Engineering, University of Iowa

Diane B. Beaudoin
Mobilization of a Broad Host Range Plasmid in Suspension and in Biofilms (S. W. Peretti and D. F. Ollis)
B.S., University of Texas, Austin

Li Ang Chen
Recovery of Proteins and Other Biological Compounds from Model and Actual Systems Using Fibrous Materials (R. G. Carbonell)
B.S., University of Sao Paulo, Brazil

Anuraag Singh
High Performance Polymer Membranes for Separation of organic Vapors from Mixtures with Permanent Gases (B. D. Freeman)
B.S., Maharashtra Institute of Technology, India

May 1997
Ravi K. Chilukuri
Surface Cleaning and Nitridation of GaP Substrates for GaN Film Growth (H. H. Lamb)
B.S., I.I.T. - New Delhi
Ph.D. Candidate in Electrical Engineering, NC State Univ.

Michael S. McCutchen
Synthesis of Alcohols from Carbon Monoxide and Hydrogen in a Slurry Reactor (G. W. Roberts)
B.S., University of Tennessee
DuPont, Deepwater, NJ

Diane M. Sherrard
Thermodynamic Modeling of n-Paraffin Mixtures Near the Critical Point (G. W. Roberts and P. K. Kilpatrick)
B.S., West Virginia University
Procter and Gamble, Greensboro, NC

Kaihong Huang
Biofiltration of Acetone Vapor in Ceramic Monolith Biofilters (D. F. Ollis)
B.S., Beijing Polytechnic University
Merck, Rahway, NJ

Kaihong Huang
Biofiltration of Acetone Vapor in Ceramic Monolith Biofilters (D. F. Ollis)
B.S., Beijing Polytechnic University
Merck, Rahway, NJ

Anuraag Singh
High Performance Polymer Membranes for Separation of organic Vapors from Mixtures with Permanent Gases (B. D. Freeman)
B.S., Maharashtra Institute of Technology, India

May 1997
Ravi K. Chilukuri
Surface Cleaning and Nitridation of GaP Substrates for GaN Film Growth (H. H. Lamb)
B.S., I.I.T. - New Delhi
Ph.D. Candidate in Electrical Engineering, NC State Univ.

Diane M. Sherrard
Thermodynamic Modeling of n-Paraffin Mixtures Near the Critical Point (G. W. Roberts and P. K. Kilpatrick)
B.S., West Virginia University
Procter and Gamble, Greensboro, NC
Joseph D. McLean
Basic Principles and Control of Refinery Emulsions
Through Crude Solvency and Resin-Asphaltene Interac-
tions
(P. K. Kilpatrick)
B.S., University of Arkansas
Albemarle Corp., Orangeburg, SC

Hsin-Chin Shen
Chain Dynamics and Phase Structure in High Barrier and
Membrane Polymers as Probed by Solid State NMR
(B. D. Freeman)
B.S., National Taipei Institute of Technology, Taiwan

May 1997
Jennifer Goodall
Development of a Point-Source Treatment System for the
Mineralization of meta- and para-Nitrobenzoate by
Comamonas sps. JS46 and JS47 (S. W. Peretti)
B.S., Virginia Polytechnic Institute
National Starch, Bridgewater, NJ

Harpreet S. Gulati
Equation of State and Thermodynamic Properties of
Fluids and Fluid Mixtures of Chain Molecules (C. K.
Hall)
B.S., I.I.T. - New Delhi
Simulation Sciences

Scott N. Reifsnyder
Supported Pd and Pd-Au Catalysts: Characterization by
X-ray Absorption Spectroscopy and Chemical Probes
(H. H. Lamb)
B.S., Bucknell University
Institut de Recherches sur la Catalyse(Villeurbanne,
France)

Easwar Srinivasan
Plasma Enhanced Chemical Vapor Deposition of Amor-
phous and Microcrystalline Silicon for Thin Film Transis-
tor Applications (G. N. Parsons)
<table>
<thead>
<tr>
<th>Category</th>
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<tbody>
<tr>
<td><strong>Alumni Association</strong></td>
<td>Timothy Merkel</td>
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<tr>
<td><strong>Chemical Engineering Faculty</strong></td>
<td>Debra Lydiard, Erik Hoggan</td>
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<tr>
<td><strong>Dean’s Fellowship</strong></td>
<td>Michael Lewandoski, Sabrina Dixon, Nicholas Young, Christopher Makosiej, Timothy Merkel, Amy Michel, Lisa Barrows</td>
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<td><strong>DuPont</strong></td>
<td>Barbara Musser, Julie McCormick</td>
</tr>
<tr>
<td><strong>Graduate Assistance in Areas of National Need</strong></td>
<td>Monica Hitchcock, Bor-Sen Chiou, Nirupama Kenkare, Walter Read, Michael Bauer, Patrick Bastek, Tonya Klein, Kevin Ledger</td>
</tr>
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<td><strong>National Consortium for Graduate Degrees for Minorities in Engineering, Inc.</strong></td>
<td>Felicia Littlejohn</td>
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<td><strong>National Organization of Black Chemists and Chemical Engineers (NOBCCE)</strong></td>
<td>Felicia Littlejohn</td>
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<td><strong>Minority Presence Grant</strong></td>
<td>Felicia Littlejohn</td>
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<tr>
<td><strong>Merck</strong></td>
<td>Paula M. Hicks, Deborah Kaufman</td>
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<td><strong>National Science Foundation</strong></td>
<td>Paula M. Hicks, Sonya Raney, Jennifer Shay, Kimberly Parker, Julie McCormick</td>
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<td><strong>Packard Foundation</strong></td>
<td>Carnley Norman</td>
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<td><strong>Southeastern Regional (SERF)</strong></td>
<td>Tonya Klein</td>
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<tr>
<td><strong>United Technologies Corporation</strong></td>
<td>Debra Lydiard</td>
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Research Expenditures

The following graph illustrates the trends in total expenditures from research grants and contracts (not including academic faculty salaries or discretionary funds). From a low of < $800,000 in 1987-88 to over $3.0 million in 1996-1997, contract and grant expenditures have risen about 350% in that time. These expenditures reflect faculty summer salaries, release time, student salaries (both graduate and undergraduates performing research), equipment, supplies, services, printing, postage, and other operational costs related to research.
## Career Placement

**Organizations Recruiting our M.S. and Ph.D. Graduates**

<table>
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<tr>
<th>Employer</th>
<th>Level of Graduate Sought</th>
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<tr>
<td></td>
<td>M.S.</td>
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<td>ADM (Archer Daniel Midland) Air Force Civilian</td>
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<tr>
<td>Albemarle Corporation</td>
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<tr>
<td>Allied-Signal Corporation</td>
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<td>Ashland Chemical Inc.</td>
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<td>BASF Corp.</td>
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<tr>
<td>Corning Inc.</td>
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<td>Cryovac</td>
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<td>DuPont</td>
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<td>Eastman Chemical Co.</td>
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<td>Exxon</td>
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<td>FMC</td>
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<td>Framatome Tech.</td>
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<td>Frito Lay</td>
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<td>Hoechst-Celanese Corp.</td>
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<td>Intel Corp.</td>
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<td>International Paper Co.</td>
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<td>Kimberly-Clark Corporation</td>
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<td>Merck &amp; Company, Inc.</td>
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<td>Motorola</td>
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<td>Nalco Chemical Co.</td>
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<td>National Starch and Chemical Co.</td>
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<td>Naval Aviation Depot</td>
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<td>Watkins-Johnson Co.</td>
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<td>Wellman, Inc.</td>
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**Salary Offers 1996-1997**

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<th>National Survey</th>
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<th>Ph.D.</th>
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<td>$45,469</td>
<td>$59,536</td>
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<td>(based on)</td>
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<td>46 offers</td>
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Faculty Activities

The Chemical Engineering Faculty at North Carolina State University is an outstanding group of teacher-scholars whose interests encompass most areas of research in chemical engineering. The faculty have strong research associations with not only the traditional academic funding groups in the Federal Government — NSF, DOE, ARO, NIH, DARPA, and others — but also with a number of major corporate sponsors, including DuPont, Mobil Oil, Bayer Corporation, Novo Nordisk, Shell Oil, Exxon, Hoechst Celanese, 3M, and Eastman Chemical.

Chemical engineering education has always had a high priority in our department, and our faculty feel a strong sense of responsibility to provide a high quality educational experience for our undergraduate and graduate students. The Department takes great pleasure in providing a scholarly environment where our faculty can develop a balanced approach towards excellence in both teaching and research. Ten of our seventeen faculty have won teaching awards at the university and/or national levels.

Activities by Faculty Member

Carbonell, Ruben G. 113Riddick
Hoechst Professor and Head 919-515-2499
B.S., Manhattan College ruben@ncsu.edu
M.S., Ph.D., Princeton University

Interests: Biochemical engineering, Molecular recognition, Bioseparations, Colloid and Interface Science, Transport Phenomena

1996-1997 Publications


DeSimone, Joseph M. UNC-Chapel Hill
Mary Ann Smith Professor 919-962-2166
B.S., Ursinus College desimone@unc.edu
Ph.D., Virginia Polytechnic Institute

Interests: Polymer and New Materials Synthesis, Polymer Science, Supercritical Fluids

1996-1997 Publications


D. Canelas; A. Burke; J.M. DeSimone, “Carbon Dioxide as a Continuous Phase for Polymer Synthesis,” Plastics Engineering, in press.


Fedkiw, Peter S. 107 Riddick
Professor 919-515-3572
B.S., University of Delaware fedkiw@eos.ncsu.edu
Ph.D., University of California, Berkeley

Interests  Electrochemical reaction engineering; Electrocatalysis; Environmental applications of electrochemistry

1996-1997 Publications


Meeting Presentations

“A Model of Copper Electrodeposition from Cyanide Electrolyte: II. Current Distribution on a Disk Electrode,” AESF SURF/FIN ’97, Detroit, June 1997 (with D. Dudek).

“Copper Electrodeposition from Cuprous Cyanide Electrolyte on a Disk Electrode,” Electrochemical Society Annual Meeting, Montreal, May, 1997 (with D. Dudek).


Invited Lectures

Felder, Richard M.  
116A Riddick
Hoechst-Celanese Professor  
919-515-2327
B.Ch.E., City College of New York  
felder@eos.ncsu.edu
Ph.D., Princeton University

Interests  
Methodologies of engineering and science education; learning and teaching styles; cooperative learning

1996-1997 Publications

R.M. Felder, “Random Thoughts.” A regular column in Chemical Engineering Education since the Fall 1988 issue, covering various aspects of education. (Some columns coauthored by R. Brent.)


Meeting Presentations

“Promoting Skill Development with Cooperative Learning,” 5th Chemical Congress of North America, American Chemical Society, Cancun, Mexico, November 14, 1997. (with Armando Rugarcia and Rebecca Brent)

“But It’s for Their Own Good: Student Resistance to Student–Centered Instruction.” Keynote address, Conference on Rethinking Key Issues in College Learning, Elon College, North Carolina, September 25, 1997.


“Personality Types and Learning Styles,” 1997 AICHE Southern Regional Student Chapter Convention, Charlotte, NC, April 4, 1997.


National Effective Teaching Institute, 1996 ASEE Annual Conference, Washington, DC, June 20–22, 1996. (with James Stice and Rebecca Brent)


Invited Lectures

Effective Teaching Workshop, Worcester Polytechnic Institute, October 23–24, 1997. (with Rebecca Brent)
Effective Teaching Workshop, University of North Carolina at Chapel Hill, October 17-18, 1997. (with Rebecca Brent)

Effective Teaching Workshop, University of Oklahoma, September 11-12, 1997. (with Rebecca Brent)

Effective Teaching Workshop, Stevens Institute of Technology, August 25-26, 1997. (with Rebecca Brent)


Effective Teaching Workshop, U.S. Naval Academy, August 15-16, 1997. (with Rebecca Brent)

Effective Teaching Workshop, NCSU Colleges of Engineering and of Agriculture and Life Sciences, August 12-14, 1997. (with Rebecca Brent)

Effective Teaching Workshop, NCSU College of Humanities and Social Sciences, August 6-8, 1997. (with Rebecca Brent)

Effective Teaching Workshop, University Rovira I Virgili, Tarragona, Spain, July 1-2, 1997. (with Rebecca Brent)

National Effective Teaching Institute, Milwaukee, WI, June 12-14, 1997. (with Rebecca Brent and James Stice)


Effective Teaching Workshop, Virginia Polytechnic Institute, April 18-19, 1997. (with Rebecca Brent)

Faculty Development Workshop, South Carolina Advanced Technological Education Consortium, Raleigh, NC, March 21-22, 1997. (with Rebecca Brent)

Faculty Development Workshop, South Carolina Advanced Technological Education Consortium, Raleigh, NC, February 28-March 1, 1997. (with Rebecca Brent)

Effective Teaching Workshop, University of Alabama-Tuscaloosa, February 24-25, 1997. (with Rebecca Brent)


Faculty Development Workshop, South Carolina Advanced Technological Education Consortium, Raleigh, NC, February 21-22, 1997. (with Rebecca Brent)

Effective Teaching Workshop, Universidade Federal de Viçosa, Viçosa, Brazil, February 6-7, 1997. (with Rebecca Brent)


Effective Teaching Workshop, Universidade Estadual de Campinas, Campinas, Brazil, February 3-4, 1997. (with Rebecca Brent)

Effective Teaching Workshop, Stevens Institute of Technology, January 9-10, 1997. (with Rebecca Brent)

Effective Teaching Workshop, National Chung Cheng University, Chia-yi, Taiwan, December 19-20, 1996. (with Rebecca Brent)

Effective Teaching Workshop, National Taiwan University, Taipei, Taiwan, December 16-17, 1996. (with Rebecca Brent)

“How Students Learn, How Teachers Teach, and What Goes Wrong,” Vanderbilt University, November 14, 1996.

Effective Teaching Workshop, College of Engineering, University of North Carolina at Charlotte, October 28-29, 1996. (with Rebecca Brent)

Effective Teaching Workshop, University of North Carolina at Chapel Hill, October 26, 1996. (with Rebecca Brent)

Effective Teaching Workshop, South Dakota School of Mines and Technology, October 18-19, 1996. (with Rebecca Brent)

Effective Teaching Workshop, University of Connecticut, September 20-21. (Linked to the Univ. of Massachusetts—Amherst, Univ. of Massachusetts—Lowell, and Univ. of Rhode Island.) (with Rebecca Brent)

“The Teaching Critical Thinking,” First-Year College, N.C. State University, November 18, 1996.

Effective Teaching Workshop, University of North Carolina at Chapel Hill, October 12, 1996. (with Rebecca Brent)

Effective Teaching Workshop, College of Engineering, August 15-16, 1996. (with Rebecca Brent)


“Learning and Teaching Styles in Engineering Education,” N.C. State University, College of Engineering Teaching Workshop for Graduate Students, August 15, 1996.

Effective Teaching Workshop, N.C. State University, College of Engineering, August 12-14, 1996. (with Rebecca Brent)


Effective Teaching Workshop, N.C. State University, College of Humanities and Social Sciences, July 16-18, 1996. (with Rebecca Brent)

Effective Teaching Workshop, N.C. State University, College of Management, July 10-12, 1996. (with Rebecca Brent)

National Effective Teaching Institute, 1996 ASEE Annual Conference, Washington, DC, June 20-22, 1996. (with James Stice and Rebecca Brent)
Effective Teaching Workshop, University of Cape Town, Cape Town, South Africa, June 6-7, 1996. (with Rebecca Brent)

Effective Teaching Workshop, University of the Witwatersrand, Johannesburg, South Africa, May 30-31, 1996. (with Rebecca Brent)

Effective Teaching Workshop, N.C. State University, College of Physical and Mathematical Sciences, May 8-10, 1996 (with Rebecca Brent)

Effective Teaching Workshop, Wayne State University, May 2-3, 1996. (with Rebecca Brent)

Effective Teaching Workshop, South Carolina Advanced Technological Education Consortium, Charleston, SC, April 18-19, 1996. (with Rebecca Brent)

“Effective Teaching,” Course on teaching for international graduate students, NCSU, April 2, 1996.

“Organizing and Presenting Effective Teaching Workshops-II,” University of Puerto Rico-Mayaguez, March 2, 1996. (with Rebecca Brent)

Effective Teaching Workshop, University of Puerto Rico-Mayaguez, January 3-4, 1996. (with Rebecca Brent)

“Organizing and Presenting Effective Teaching Workshops,” University of Puerto Rico-Mayaguez, January 4, 1996. (with Rebecca Brent)

Freeman, Benny D. 315 Riddick Associate Professor and 919-515-2460 Associate Department Head benny_freeman@ncsu.edu B.S., NC State University Ph.D., University of California, Berkeley

Interests Sorption, transport, and permeation of small molecules in polymers; Polymer physics; Polymer chain dynamics

1996-1997 Publications


Meeting Presentations


Invited Lectures


“A Comparison of Sorption and Permeation Properties of Two High Free Volume Glassy Polymers: Poly(1-trimethyl-silyl-1-propyne) [PTMSP] and Poly(tetrafluoroethylene-co-2,2-bistrifluoromethyl-4,5-difluoro-1,3-dioxole) [Amorphous Teflon],” Department of Chemical Engineering, University of Bologna, Bologna, Italy, June, 1996.

“A Comparison of Sorption and Permeation Properties of Two High Free Volume Glassy Polymers: Poly(1-trimethyl-silyl-1-propyne) [PTMSP] and Poly(tetrafluoroethylene-co-2,2-bistrifluoromethyl-4,5-difluoro-1,3-dioxole) [Amorphous Teflon],” Seikei University, Tokyo, Japan, August, 1996.


“Sorption and Transport Properties of Stiff Chain Glassy Polymers,” Kobe University, Kobe, Japan, August, 1996.


“Sorption and Transport Properties of Stiff Chain Glassy Polymers,” Meiji University, Kawasaki, Japan, August, 1996.

1996-1997 Publications

C. Grant, M. Overcash, S. Beaudoin, “Pollution prevention in Chemical Engineering,” Chemical Engineering Education, Fall, 246-251, 1996.


Meeting Presentations


“Removal of Organic Films from Rotating Disks by Aqueous Solutions of Nonionic Surfactants: Effect of Surfactant Molecular Structure and Substrate Composi-


Invited Lectures


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Hall, Carol K. 119A Riddick
Professor 919-515-3571
B.A., Cornell hall@turbo.che.ncsu.edu
M.A., Ph.D., S. U. N. Y. Stony Brook

Interests Statistical Thermodynamics, Computer Simulations, Polymers, Protein Folding, Properties

1996-1997 Publications


Meeting Presentations


“Nonequilibrium Grand Canonical Molecular Dynamics Simulations of Penetrant Permeation in Facilitated Transport Polymers”, AIChE Annual Meeting, Chicago, November, 1996 [with S. Sunderrajan and B. Freeman, presented by S. Sunderrajan].


Invited Lectures

“Towards a New Equation of State for Hydrocarbons and Polymers”, Chemical Engineering Department, Ohio State University, Columbus, October, 1996.


“Towards a New Equation of State for Hydrocarbons and Polymers”, Chemical Engineering Department, University of Toronto, Toronto, October, 1996.

“Molecular Dynamics Simulations of Entangled Hard Chain Fluids,” Chemistry Department, University of North Carolina, Chapel Hill, October, 1996.

“Towards a New Equation of State for Hydrocarbons and Polymers”, Chemical Engineering Department, University of Virginia, Piscataway, March, 1997.


“Towards a New Equation of State for Hydrocarbons and Polymers”, Chemical Engineering Department, Stanford University, Stanford, April, 1997.

“Towards a New Equation of State for Hydrocarbons and Polymers”. Pharmacy Department, University of California at San Francisco, April, 1997.

Kelly, Robert M. 223 Riddick
Professor 919-515-6396
B.S., University of Virginia kelly@che.ncsu.edu
M.S., University of Virginia
Ph.D., North Carolina State University

Interests Biochemical engineering, biocatalysis at extremely high temperatures, microbial physiology, enzyme engineering

1996-1997 Publications


**Meeting Presentations**


**Invited Lectures**

“Biology and biotechnology of hyperthermophilic microorganisms”, presented at:

- University of Virginia, December, 1995.
- Northwestern University, February, 1996.

**Khan, Saad**

Associate Professor 919-515-4519

B.S., Princeton University khan@eos.ncsu.edu

Ph.D., Massachusetts Institute of Technology

**Interests**

Polymer science; Rheology of complex fluids; Sol-Gel rheology

**1996-1997 Publications**


**Meeting Presentations**


“Alkali-Soluble Associative Polymers: Solution Rheology and Interactions with Nonionic Surfactants,” XIIth Int’l Congress Rheol., Quebec City, Canada, August 1996


**Invited Lectures**


“Polymer Rheology Summer Course,” (3 credit units) University of Campinas (Unicamp), Brazil, Department of Polymer Technology, July 1996.


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Kilpatrick, Peter K.  
221A Riddick  
Professor and Associate Head  
919-515-7121  
peter-k@eos.ncsu.edu  
B.A., Chemistry, Occidental College  
Ph.D., University of Minnesota  
**Interests**  
Colloid and interface science, Bioseparations, Emulsions, Foams

**1996-1997 Publications**


**Meeting Presentations**


“The Role of Inorganic Solids in Stabilization of Water-in-Crude Oil Emulsions,” Annual AIChE Meeting, Chicago, IL, November 1996 (with Andrew Sullivan)


“The Role of Inorganic Solids in Stabilization of Water-in-Crude Oil Emulsions,” American Chemical Society Colloid and Surface Science Symposium, Newark, DE, June 1997 (with Andrew Sullivan [speaker])

**Invited Lectures**


“Molecular Characterization of Paraffinic and Micro-Crystalline Waxes Precipitated from Crude Petroleum,” International Symposium on “Thermodynamics of Wax Precipitation from Petroleum”, National AIChE Meeting, Houston, TX, March 10-13, 1997 (with Barbara Musser [speaker])


**1996-1997 Publications**


**Meeting Presentations**

“In-Situ X-ray Absorption Fine Structure (XAFS) Studies of Supported Metal Clusters and Their Interactions with Hydrogen,” Workshop on Applications of Synchrotron Radiation to In-Situ Catalyst Characterization, Baltimore, MD, July 1996.


“Size-Dependent Reactivity of Supported Pd Clusters with H₂ and C₂H₄,” AIChE Annual Meeting, Chicago, IL, November 1996. (with S. N. Reifsnyder)


**Invited Lecture**


**Lim, P. K.**  
208 Riddick  
Professor  
919-515-2328  
B.S., Cornell University  
lim@eos.ncsu.edu  
M.S., Ph.D., University of Illinois  

**Interests**  
Homogeneous reaction kinetics, free-radical catalysis, interfacial reactions

**1996-1997 Publications**


**Meeting Presentations**


“Biphasic Autoxidation of Tetralin Catalyzed by Surface-Active Transition Metal Complexes,” Paper 95i, AIChE Annual Meeting, Chicago, IL, November 13, 1996 (with W. S. Ahn).

**Ollis, David F.**  
225 Riddick  
Hoechst Professor  
919-515-2329  
B.S., Caltech  
ollis@eos.ncsu.edu  
M.S., Northwestern University  
Ph.D., Stanford University  
Postdoctoral, Centre de Cinetique Physico-Chimique, France  

**Interests**  
Photocatalysis, photocatalytic air treatment, biochemical engineering, biofiltration

**1996-1997 Publications**


“Team Teaching of a First Year Rhetoric and Laboratory”
Ann Brown and D. F. Ollis, ASEE June 1996 Proceedings

**Meeting Presentations**

“Team Teaching a First Year Rhetoric and Laboratory,”
Ann Brown* and David F. Ollis*, ASEE meeting, Washington, DC, June, 1996.


“Implementation of Writing Across Engineering with a First Year Laboratory,” ASEE meeting, Milwaukee, WI, June 16-18, 1997.


**Invited Lectures**


“Photocatalytic Activity of TiO2 and ZnO Semiconductors,” Food and Drug Administration, Rockville, MD, September, 1996 (in connection with new forms of TiO2 and ZnO in sunscreen agents)


“Two Step Chemical and Biological Oxidation of Water Pollutants,” Chemical Engineering Department, University of Maryland, Baltimore County, MD, Mar. 17, 1997.


“Combined Chemical and Biological Oxidation for Water Purification”; “Kinetics Models and Scanning Microfluorimetric Validation,” and “Product and Process Engineering First Year Laboratory,” Chemical Engineering Department, UNICAMP, Campinas, Brazil, August 18-22, 1997.

“Product and Process Engineering First Year Laboratory,” Chemical Engineering Department, Federal University of Sao Carlos, Brazil, August 21, 1997.

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**Overcash, Michael R.**

317 Riddick
Professor
919-515-2325
overcash@eos.ncsu.edu
B.S., North Carolina State University
M.Sc., University of New South Wales
Ph.D., University of Minnesota

**Interests**

Pollution Prevention, life cycle research, cleaner manufacturing technologies, land treatment and environment

**1996-1997 Publications**

C. Grant, M. Overcash, S. Beaudoin, “Pollution prevention in Chemical Engineering,” Chemical Engineering Education, Fall, 246-251, 1996.


Meeting Presentations


“Cleaner Technology, Plenary Lecture,” Third European Roundtable on Cleaner Production, Kalundborg, Denmark, November 2, 1996.


“Pollution Prevention and Life Cycle in Chemical Engineering,” XIV Symposium of Chemical Engineering, Monterrey, Mexico, March 6, 1997.


“Cleaner Production Research,” University of Concepcion, Concepcion, Chile, May 12, 1997.

Invited Lectures


“Pollution Prevention Research Center,” Danish Technical University, Lyngby, Denmark, November 1, 1996.


Parsons, Gregory N. 217 Riddick
Assistant Professor 919-515-7553
BA, Geneseo State College, NY  parsons@ncsu.edu
Ph.D., North Carolina State University

Interests

Surface reactions and chemical processes in electronic materials synthesis; Bonding structure and electronic properties of inorganic semiconductors and insulators; Physics of thin film devices

1996-1997 Publications


**Meeting Presentations**


E. Srinivasan, D.A. Lloyd and G.N. Parsons, “Inert gas dilution and ion bombardment effects in room temperature plasma deposition of a-Si:H” Materials Research Society Spring Meeting San Francisco, CA, April 11, 1996

G.N. Parsons “Progress toward High Performance TFT's” DARPA/EPRI Workshop, Washington DC, April 15, 1996

G.N. Parsons “Manufacturable High Performance TFT’s” DARPA Information Exchange Conference Washington DC, April 17, 1996


E. Srinivasan, S.J. Ellis, R.J. Nemanich, and G.N. Parsons “Large crystalline silicon films deposited by pulsed-gas PECVD” for oral presentation at MRS Fall meeting, Dec., 1996.


E. Srinivasan and G.N. Parsons “Plasma enhanced chemical vapor deposition of amorphous and microcrystalline silicon for thin film transistor applications” at Lawrence Livermore National Laboratory, CA, April 1997.

**Invited Lectures**


G.N. Parsons “Selective Area Silicon Deposition for Active Matrix Liquid Crystal Display Applications” AVS Annual Meeting, Oak Ridge National Laboratory, May 1997.

“Thin Film Deposition Reactions for Large Area Electronics on Plastics” Dept. of Chemical Engineering, Cornell University, Sept. 1997.

G.N. Parsons “Thin Film Materials for Bistatic Micro-Mechanical Smart Systems and Displays” Dept. of Materials Science and Engineering, NC State University, Sept. 1997.
Peretti, Steven W.  
221 Riddick  
Associate Professor  
919-515-6397  
B.S., Yale University  
peretti@eos.ncsu.edu  
Ph.D., California Institute of Technology  

**Interests**  
Biocatalytic synthesis of chiral compounds, immobilized cell reactor design, bioremediation, metabolic characterization and manipulation

1996-1997 Publications  
D. L. Beaudoin, J. D. Bryers, A. B. Cunningham and S. W. Peretti, “Plasmid transfer from *Pseudomonas* to established biofilms in a rotating annular reactor”, *Biotechnology and Bioengineering*, in press.  

“Continuous Culture Dynamics for Aniline Metabolism by *Pseudomonas sp. CIT1*”, S. M. Thomas and S. W. Peretti, *Biotechnology and Bioengineering*, in press.

Invited Lectures  
“Biofilm Characterization”, UNC-CH, Cystic Fibrosis Pulmonary Section, UNC Medical Center, January 17, 1997  
“Membrane Biotreatment of VHAP/VOC Emissions”  
American Furniture Manufacturers Association, Manufacturing and Human Resources Conference, March 6, 1997, American Institute of Chemical Engineers - Triangle Local Chapter, April 25, 1997  
“Membrane Biotreatment System”, EPA/NCSU/Wood Furniture and Cabinet Industry Third Annual Meeting: VOC Treatment Technologies, June 3, 1997,  
“Biocatalysis in Organic Synthesis: Production of *p*-Hydroxybenzoic Acid from Toluene Using an Engineered Strain of *Pseudomonas*”, Hoechst A.G., Frankfurt, Germany, August 5, 1997

Roberts, George W.  
349 Riddick  
Professor  
919-515-7328  
B.Ch.E., Cornell University  
groberts@eos.ncsu.edu  
Sc.D., Massachusetts Institute of Technology  

**Interests**  
Chemical reaction engineering, applied catalysis, chemical reactor analysis and design, pollution prevention and control, alternate fuels

1996-1997 Publications  


Meeting Presentations  
“Thermodynamics of Methacrylate Synthesis from Methanol and a Propionate”, AIChE Annual Meeting, Chicago, IL, November 10-15, 1996 (with J. R. Mullen and E. H. Shreiber [speaker]).  
“Catalyst Deactivation of 3% Pt/h-Al,O$_3$ for the Hydrotreatment of 1,1,1 Trichloroethane”, AIChE Spring National Meeting, Houston, TX, March 9-13, 1997 (with K. A. Frankel, B. Jang, and J. J. Spivey)  


Spontak, Richard J. 243 Riddick
Associate Professor 919-515-4200
B.S., Penn State University rich_spontak@ncsu.edu
Ph.D., University of California, Berkeley

**Interests**
Polymere science and engineering, Colloid and Interface Science, Microstructured Fluids and Solids, Microscopy Techniques

1996-1997 Publications


**Meeting Presentations**


“Effect of Monomer Sequencing on the Phase Behavior of Novel Block Copolymer/Homopolymer Blends,” American Institute of Chemical Engineers Meeting, Chicago, IL, 1996.


“Controlled Morphology-Property Development of Triblock Copolymers through the Addition of Midblock-Compatible Homopolymer,” North Carolina American Chemical Society Polymer Discussion Group Triangle Student Symposium, Raleigh, NC, 1997 (with L. Kane [speaker]).

“Characterization of Barrier Properties in Poly(vinylidenefluoride)/Graphite Composites,” North Carolina American Chemical Society Polymer Discussion Group Triangle Student Symposium, Raleigh, NC, 1997 (with D.N. Busick [speaker]).

“Effects of Mechanical Milling on PET and Its Alloys with Vectra,” North Carolina American Chemical Society Polymer Discussion Group Triangle Student Symposium, Raleigh, NC, 1997 (with C. Bai [speaker]).

“Morphological Studies of SiOx Coatings Deposited on Polymer Substrates to Enhance Barrier Efficacy: Effect of Deposition Power,” American Chemical Society National Meeting, San Francisco, CA, 1997 (with B.-C. Wang [speaker]).

“Morphology and Barrier Property Correlation in Polymer/Graphite Composites,” Spring Materials Research Society Meeting, San Francisco, CA, 1997 (with D.N. Busick [speaker]).

“Morphology/Barrier Property Correlation of Plasma-Coated SiOx Films on Polymer Substrates,” Spring Materials Research Society Meeting, San Francisco, CA, 1997 (with B.-C. Wang [speaker]).

“Complex Phase Behavior in Triblock Copolymer/ Homopolymer Blends,” American Physical Society Meeting, Kansas City, MO, 1997 (with L. Kane [speaker]).

“Effect of Chain Restriction on the Resulting Morphology and Mechanical Properties of Triblock Copolymer Blends,” Fall Materials Research Society Meeting, Boston, MA, 1996 (with L. Kane [speaker]).

“Conformational and Dynamic Properties of Double-Tethered Chain Molecules at an Impenetrable Interface,” Fall Materials Research Society Meeting, Boston, MA, 1996 (with H.S. Gulati [speaker]).
Other Faculty

Setzer, C. John  
216 Riddick  
Professor  
B.Ch.E., Ohio State University  
M.S., Ohio State University  
Ph.D., Ohio State University  
setzer@eos.ncsu.edu

Interests  
Unit operations, process and plant design, economics, polymer processing.

Winston, Hubert  
206 Riddick  
Associate Professor and Coordinator of Advising  
B.S., North Carolina State University  
M.S., North Carolina State University  
Ph.D., North Carolina State University  
winston@eos.ncsu.edu

Interests  
Transport processes, process modeling and control, computer modeling.

Emeritus Faculty

Beatty, Kenneth O.  
12 Riddick  
R.J. Reynolds Professor Emeritus  
B.S., Lehigh University  
M.S., Lehigh University  
Ph.D., University of Michigan

Interests  
Heat transfer, thermodynamics, biomedical engineering, fire cause and origin.

Ferrell, James K.  
Dean Emeritus, College of Engineering  
B.S., University of Missouri  
M.S., University of Missouri  
Ph.D., North Carolina State University

Interests  
Heat pipes, heat transfer, adsorption

Stannett, Vivian T.  
114 Riddick  
Dean Emeritus, Graduate School  
B.S., Chemistry, London  
Ph.D., Chemistry, Polytechnic Institute of Brooklyn

Interests  
Pure and applied polymer science, cationic polymerization, block and graft copolymerization, radiation chemistry of polymers, cellulosics, textile modification, transport in polymers.
Faculty Awards and Honors

Joseph Desimone
- Presidential Green Chemistry Challenge Award (1997)
  (Only one academic in the US - awarded by the President during ACS meeting in June)
- Governor’s Award for Excellence (1997)
- Chancellor’s Award for Excellence (1997)

Richard M. Felder
- The University Board of Governors’ Award for Teaching (1997) (System-wide award)
- Wickenden Award from ASEE (1997) (Best paper in J. of Engineering Education)
- Fellow of the ASEE (1996)

Benny D. Freeman
- NC State University Academy of Outstanding Teachers (1997)
- College of Engineering Outstanding Teaching Award (1997)
- United Technologies Excellence in Teaching Award (1997)
- Japan Society for the Promotion of Science Research Fellowship (1997)

Christine S. Grant
- Lloyd M. Ferguson Young Scientist Award: National Organization of Black Chemists and Chemical Engineers (1997)
- Council of Outstanding Young Engineering Alumni
- Georgia Institute of Technology (1996)
- NC State Provost’s African-American Professional Development Award (1996)

Harold B. Hopfenberg
- Alexander Quarles Holladay Medal, NC State University (Highest honor bestowed by Board of Trustees and NC State University; recognizes outstanding contributions to teaching, research and service)

Robert Kelly
- NC State Alumni Association Outstanding Research Award (1997)

Saad Khan
- Alcoa Foundation Engineering Research Achievement Award (1996)
- ALCOA Foundation Engineering Research Achievement Award (1997)

David F. Ollis
- W. Corcoran Award, ASEE, Chemical Engineering Division (1996)
- NC State University Alumni Distinguished Research Professor Award (1997)

Gregory N. Parsons
- National Science Foundation Career (1996)

Richard J. Spontak
- Micrograph featured on the front cover of *Langmuir* (1997) (Transmission electron microtomograph of the L3 sponge morphology in a block copolymer blend)
- Micrograph featured on the front cover of the *Journal of Materials Science* (1996) (Electron micrograph showing a fiber-reinforced composite upon long-term degradation)
- Senior Design Team Advisor Award (1996)
- Micrograph featured on the front cover of *Langmuir* (1996) (Images showing that polymer birefringence could be imaged at sub-micron resolution)

Vivian Stannett
- Olney Medal from the American Association of Textile Chemists and Colorists (Outstanding achievement in textile or polymer chemistry) (1996)
- Gossett Lecturer at NC State College of Textiles (1997)
## Courses Taught

### Fall 1997

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### First Summer Session 1997

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### Spring 1997

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Visitors and Staff

Seminars Presented in the Department 1996-97

Fall 1996

Prof. Joseph A. Zasadzinski, University of California, Santa Barbara, Department of Chemical Engineering, “Optical and Probe Microscopy of Lipid-Protein Monolayers: A Model Lung Surfactant” (September 16, 1996).

Prof. Mark A. Burns, University of Michigan, Ann Arbor, Department of Chemical Engineering, “Microfabrication of an Integrated DNA Analysis System” (September 25, 1996).

Prof. Ruben G. Carbonell, North Carolina State University, Department of Chemical Engineering, “Chemical Engineering Forum: Graduate Education” (September 30, 1996).

Dr. Colin Wolden, North Carolina State University, Department of Materials Science and Engineering, “Diamond Chemical Vapor Deposition: Investigations Using In-Situ Mass Spectroscopy and Detailed Kinetics” (October 7, 1996).

Prof. Martin Feinberg, University of Rochester, Department of Chemical Engineering, “An Introduction to Chemical Reaction Network Theory” (October 21, 1996).


Prof. Keith E. Gubbins, Cornell University, Department of Chemical Engineering, “Fluids in Nanospaces: Some Recent Simulation Studies” (November 4, 1996).

Prof. Timothy J. Anderson, University of Florida, Department of Chemical Engineering, “Chemical Engineering Approaches to Chemical Vapor Deposition of Compound Semiconductors” (November 25, 1996).

Spring 1997

Prof. Keith P. Johnston, University of Texas, Austin, Department of Chemical Engineering, “Polymer Colloids in Supercritical Fluid Carbon Dioxide” (January 27, 1997).

Prof. Arup K. Chakraborty, University of California, Berkeley, Department of Chemical Engineering, “Interfacial Behavior of Random Heteropolymers” (February 10, 1997).

Prof. Karen K. Gleason, Massachusetts Institute of Technology, Department of Chemical Engineering, “Pulsed Plasma Enhanced and Pyrolytic CVD of ‘Teflon-like’ Thin Films” (February 24, 1997).

Prof. Pablo G. DeBenedetti, Princeton University, Department of Chemical Engineering, “Thermodynamics of Supercooled and Glassy Water” (March 3, 1997).

Prof. Johan Sjöblom, University of Bergen (Norway), Department of Chemistry, “Stability of Emulsions as Probed by Dielectric Spectroscopy” (March 17, 1997).

Prof. Morton M. Denn, University of California, Berkeley, Department of Chemical Engineering, “Polymer/Wall Interactions as a Factor in Melt Flow” (March 24, 1997).

Dr. Jan Lerou, DuPont Experimental Station, Wilmington, DE, “Microreactors for Chemical Manufacture: Reality or Utopia?” (April 14, 1997).

Prof. William M. Miller, Northwestern University, Department of Chemical Engineering, “Culture Systems for Expansion of Hematopoietic Progenitor Cells: Applications for Transplantation Therapies” (April 21, 1997).
Staff

Research Staff

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Departmental Staff

Kathy Cannady, Accounting Clerk
Melanie Cooke, Contract Manager
Faye Dent, Administrative Assistant
Gwendolyn Johnson, Undergraduate Secretary
Pat Innamorato, Administrative Assistant
Shirley Kow, Graduate Secretary
Tammy Self, Receptionist
Ching-Kit Yeung, Instrument Maker
Randall Wells, Research Assistant
# Financial Summary

## Department Sponsors

The Department of Chemical Engineering gratefully acknowledges the support provided by the industries, government agencies, institutes, and foundations listed below:

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