

Jeffrey Allen Reimer—in reflection

ARTICLE INFO

Keywords:
NMR
Biography

1. Introduction

A journal issue, a “festschrift”, crafted in honor of someone in our research community is a wonderful time to reflect on the many gifts that have been given to us. How do you mirror four decades of research, teaching, mentorship, and collegiality? It can be measured in papers and metrics, conference presentations and awards, discoveries and contributions to field-changing work, proteges trained and networks, but most importantly in stories – stories and recollections of those who can span those decades

What follows is a collection of short essay-length reflections organized around the major dimensions of Jeff's career and character, mostly collected through a series of interviews with each of the named associates, as well as significant multi-hour oral history-style conversations between us co-authors. We begin with a personal recollection from Cecil Dybowski (University of Delaware), a fifty-year friend and fellow traveler in NMR, that introduces Jeff as a scientist and a person. An editorial summary of his research contributions follows, tracing the arc from his Caltech training through four decades of inventive, wide-ranging work at University of California Berkeley. Velencia Witherspoon (Tulane University) then reflects on mentorship and community in Jeff's laboratory, followed by an editorial account of his remarkable teaching career. Bernhard Blümich (RWTH Aachen University) offers a perspective on Jeff's scientific voice and the international collaborations that grew from their friendship. The piece closes with reflections on Jeff's relationships with colleagues, collaborators, students, and family, relationships that Jeff himself names as his greatest achievement. Each person was offered the opportunity to identify a single key word to describe Jeff, and those are the headings of each testimonial section. Throughout, we have tried to let the voices of those who know him best carry the weight of description, trusting that the picture they paint together is more faithful than any single summary could be. Rather than a formal biography that one can reconstruct from a C.V., this editorial is an opportunity to lead into the Festschrift by offering a more colorful

picture.

The dates and places of Jeff's career can be found elsewhere [1]. Briefly, it is fair to say that as a youth he embraced the quintessential Californian spirit: raised in Los Angeles, spent weekends either at the beach or skiing, rode motorcycles, hiked the Sierra Nevada mountains, and cherished the sounds classical- and jazz-rock. He applied to only one college – University of California Santa Barbara (UCSB) – “because it was far away” (90 miles!) from his family, none of whom were college-educated. He loved space flight, NASA [Fig. 1], and Star Trek (often watched many times). After undergraduate research in NMR with J.T. “Tom” Gerig at UCSB, he earned a Ph.D. in chemical physics at Caltech.

Jeff defied categorization: although a chemical physics student, he chose to work with a chemical engineer (Robert “Bob” Vaughan, for which the RMC Vaughan lectureship is named). When Bob Vaughan was suddenly killed in a tragic accident, Jeff completed his dissertation at Xerox PARC working on solar cell materials alongside Cambridge (UK)-educated physicists. While peers pursued academic postdocs, Jeff went instead to IBM Yorktown Heights, hoping to further a career in condensed matter physics. He pivoted again, this time to Berkeley's chemical engineering department [Fig. 1], where he would remain for the rest of his career.

2. “Polymath”

Jeff displayed multiple intelligences and was just so good at them all. As a 50-year friend, I can say that Jeff has never just done NMR. Sure, there are a lot of people who do examples of NMR with model systems, but Jeff always set out to solve wider problems. Funny, he's always working on something that's “not NMR”. Sure, he's building a coil for surface NMR, but he tells me “it's technology to do XYZ” (and not to DO NMR, I can say with a chuckle). Jeff works on applications, and he designs NMR techniques to address those applications, like what species are on an electrode? Or what happens to this chemical reaction at 1200 °C to 1500 °C

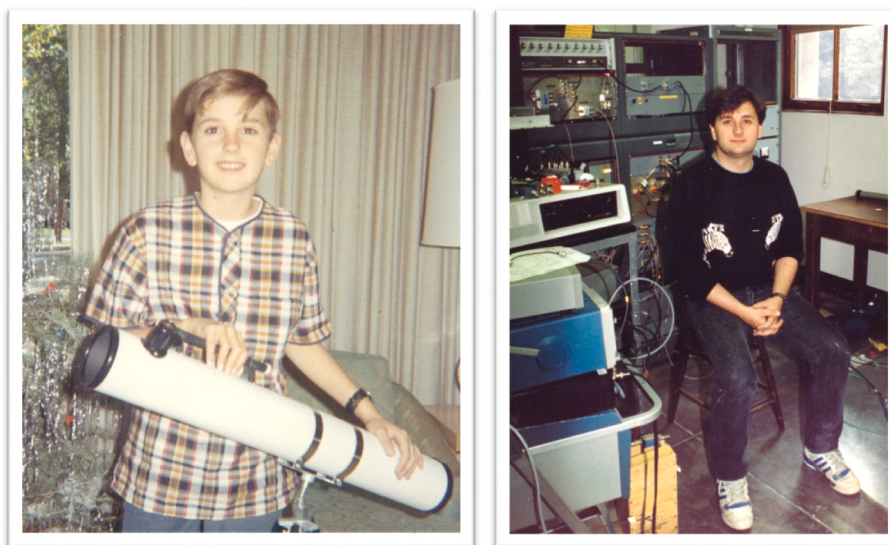


Fig. 1. Evidence of Jeff as a science nerd as a young teen (1967) and during his early years at UC Berkeley (~1984). Did those young men know what was coming?



Fig. 2. – Cecil with Jeff, and by the trees in the photo, you just know it's the Asilomar ENC in California.

(building probes along the way to go there). That 50-year friendship started back in Sept. 1976, or was it Jan 1977? I was out at the GRC in Ventura, and Bob Vaughan, our advisor, said “I have this new student ...”. Visiting Caltech—having graduated only a few years before and in my independent career already at Univ. of Delaware— I followed Mike Duncan [an older Vaughan Ph.D. student at the time, now a professor at Cornell University] down to the student office in the lab, and I like to tell the story that I walked into their lab and met Jeff Reimer's rear-end, sticking out from under a table first! (He and Mike had these pet chameleons and one had just escaped.) You see, his inquisitiveness went beyond research, beyond work.

He was always interested in other people—at the ENC (see Fig. 2), we would stay offsite, and he was always concerned about student progress. He has always been caring about people, and he remarks when asked “what is your greatest achievement?”, as you'd expect ... “my students.” There was concern for the university, as a whole, and he took on an administrative role for a while. (see Teaching and Mentoring Highlights, below.)

Maybe the most telling is that he has been recognized with the most prestigious teaching award at University of California (UC) Berkeley, the Distinguished Teaching Award. Not only are his abilities recognized there, but it's meaningful that he is prouder of that than any specific paper (in his telling).

The story of Bob Vaughan is both poignant and sad. Jeff was in his 3rd year when the airline accident occurred. If you look at the timeline carefully, you realize that Jeff had to teach himself everything, or nearly so. He already had signs of being a leader. Sunney Chan (Dr. Sunney Chan, Caltech) told me that he was the signing authority for the group, but truly most of the Vaughan group “did their own thing”. Basically, Jeff was adult enough to finish the dissertation himself on hydrogenated silicon.

I like to tell the story, that I talked with him about taking the job at UC Berkeley, in Chemical Engineering, of all things. I think most of us know today: he is a chemist by training. I know he had offers elsewhere. But somehow, Jeff just knew this was the right move. And we can all say to ourselves, “well, look how that turned out!” So many students, papers, patents, textbooks, and teaching awards later ... it's a life well lived, and a career well spent.

– Prof. Cecil Dybowski.

3. Research highlights

Jeff Reimer's research career began in Prof. Tom Gerig's lab at the University of California, Santa Barbara (UCSB), measuring relaxation times for small molecules binding to proteins. During the course of his career, he applied NMR to a wide range of scientific problems, often seeming like something of an explorer, with contributions spanning areas from photovoltaics and amorphous semiconductors to materials for energy conversion and storage, including carbon capture technologies, fuel cells, and batteries.

Jeff has long been known for developing novel NMR hardware and experimental methodologies – notably in situ electrochemistry, catalysis, fluid flow, and extremes of temperature within NMR probes – as well for fundamental studies of optical pumping in semiconductors and the structural and adsorption properties of zeolites and MOFs (metal-organic frameworks) – impacting fields from catalysis to environmental

remediation.

His free-spirited attitude towards NMR hardware is reflected in his acquisition of a wide-bore 300 MHz spectrometer from a building across campus – free if he could just come and get it. So early on a weekend morning his group picked up the **energized** magnet with a small crane, put it on the back of a pick-up truck, and brought it to his lab. Upon arrival, the bore “picked up” a few stray pieces of metal, which were discharged by slamming an 89 mm wooden dowel through the bore. (Editorial note: no worse for wear, the magnet would go on to produce a paper in *Science*.)

Alongside the development of extreme things to do in an NMR probe, there were always exotic experiments going on in the lab. Memorable ones include optically-pumped Xe delivered to interrogate porous solids and optical pumping of semiconductors at 4 K for exploration of spin dynamics with conduction electrons. He picked up a (free!) Bruker MRI instrument from a salvage company and repurposed it for experiments that required an assortment of fluids and tubing snaking through the lab and into the probe. At times both challenging and amusing to onlookers, the lab was filled with magnets arranged with opposing fields so they could be placed unusually close together. A laser ran at ankle height across the floor, surrounded by improvised curtains, and amplifier carts sat elevated on blocks because the basement occasionally flooded during unusually heavy Bay Area rainstorms.

Jeff loved his time at IBM – extraordinary freedom, abundant resources, and brilliant colleagues. He especially cherished doing “donuts” in the snow-covered parking lot on winter weekends. In his interview he expressed how the IBM research staff were rewarded for collaboration, rather than siloed expertise, likely shaping his own career-long commitment to interdisciplinarity and collaboration.

It was following his IBM experience that he ended up – memorably – deciding to take the position at UC Berkeley in the Department of Chemical Engineering, amusingly a discipline in which he had never taken any coursework. (Fortunately, the tenure vote was “yes” – and they didn't hold his chemical physicist-ness too much against him!)

4. Altruism as a mentor

I first met Jeff while I was an undergraduate at Florida A&M University, when he visited Tallahassee. At the time I was interested in polymers and transport phenomena and was not specifically planning to pursue NMR. Nevertheless, those early interactions stayed with me, and when I later applied to Berkeley, I ultimately chose to join the Reimer group.

After I arrived at Berkeley, Jeff was the only professor who openly acknowledged that transitioning from an historically Black college and university (HBCU) to a large research university like Berkeley might involve some adjustment. He asked how I was doing and whether I felt I was settling in. That simple act of awareness meant a great deal to me. It signaled that he understood that becoming a scientist is not just about research topics or technical skills, but also about navigating new environments and communities. In that moment, I felt that he saw me as a whole person.

Some of my favorite memories of Jeff involve the many conversations we had walking from his office over to Strada for coffee, almost always his treat. We talked about science, of course, but also about life, career paths, and the broader perspective of being a scientist. Those walks were informal mentoring sessions that often shaped how I thought about research and about the kind of scientist I hoped to become.

Jeff's lab was a place where students were trusted to explore ideas. There was a sense of intellectual freedom and encouragement to pursue questions that genuinely interested us. That environment created a strong sense of community, helped along, of course, by frequent coffee gatherings in the lab (what our German colleagues might call Kaffeestunden). The culture Jeff fostered made the lab feel like a place where it was safe to think creatively, to try things, and to learn from experiments that did not work the first time.

Research inevitably involves failures and false starts. Yet Jeff created a community where those setbacks were simply part of the process of discovery. His mentoring style emphasized independence and curiosity, giving students



Fig. 3. Jeff with Velencia; some of our best memories come from those conferences where we get to gather, like mini-reunions, over decades. Here at a meeting in Florida in 2018.

the space to develop their own scientific instincts. Looking back, that freedom was formative. It helped prepare me for the career I have today as a faculty member at Tulane University.

One final memory still makes me smile. Years later, at an International Conference on Magnetic Resonance Microscopy (ICMRM) meeting [Fig. 3], Jeff and I met early in the morning—and for once, I had the chance to buy him coffee. It was a small gesture, but it meant a great deal to me to return the favor and share a conversation with him, this time as a colleague.

–Prof. Velencia Witherspoon.

5. Teaching and mentoring highlights

It will come as no surprise, reading those testimonials or reflecting on his career, that Jeff Reimer has won virtually every teaching award on the Berkeley campus – at the department, college, physical sciences, campus, and national level, including the Donald Sterling Noyce Prize for Excellence in Undergraduate Teaching in the Physical Sciences, the American Institute of Chemical Engineers (AIChE) Northern California Section Award for Chemical Engineering Excellence in Academic Teaching, the UC Berkeley Distinguished Teaching Award in 2003 – the highest award bestowed on faculty for their teaching – and the Warren K. Lewis Award from AIChE for “distinguished and continuing contributions to chemical engineering education.”

Jeff Reimer is renowned for his teaching in the field of chemical and biomolecular engineering. His introductory textbook, *Chemical Engineering Design and Analysis: An Introduction* (co-authored with T. Michael Duncan) [2], focuses on teaching chemical engineers about the importance of design concepts early in their curriculum. He commented to me that, like Malcolm Levitt's *Spin Dynamics*, his text is meant to be read as a narrative (rather than a work of reference). He widely read books on teaching and learning in higher education, and this helped him frame his teaching approach—one that emphasizes deep learning rather than the simple delivery of information. In service to UC Berkeley, he also helped establish campus-wide initiatives for teaching assistantship (TA) training, mentoring, and teaching awards for graduate students.

Not above being a learner himself: even after years of teaching, he was happy to shift gears and become a student of new areas, so he could keep up with current trends. Many of us will recall he then pivoted his research to climate change, he introduced a new course on carbon capture at Berkeley, then co-authored a textbook on the subject (*Introduction to Carbon Capture and Sequestration*) [3].

His teaching philosophy centers around fostering a deep understanding of complex scientific principles **and** their practical applications. Reimer has offered comprehensive courses covering topics such as

Table 1

Reimer group members.

PhD Students	PhD Students (cont)	Former Postdocs
Mike McCarthy	Brian Mayer	Pei Tang
Karen Gleason	Paul Hudson	YiQiao Song
Mark Petrich	Joel Stettler	Joachim Kruger
Grant Haddix	Michael Liszka	Mathias Haake
Karl Amundson	Jonathan King	Sarah Larson
Marjorie Went	Matthew Dodd	Sanlin Hu
Janet Griffiths	Joseph Chen	Becky Gee
Roni Fernandez	Eric Scott	Sophia Hayes
Phil Armstrong	Melanie Drake	Galina Pavlovskaya
Stu Adler	Velencia Witherspoon	Young Joo Lee
Claudia Ocampo	Thomas Osborn Popp	Birgit Schweickert
Mike Gentzler	Kaitlyn Engler	Marie Kerlau
Liz Juang	Hao Zhuang	Shashi Vyas
Mark McCormick	Alireza Pourghaderi	Young Joo Lee
Mike Tucker	MS Students	Jian Feng
Heiko Niessen (U Bonn)	Julie Memering	Xueqian Kong
Anant Paravastu	Rick Ranthotra	Jun Xu
Vicky Demas	Karen Carr Bustillo	Alexander Forse
Phil Morrison	Nick Kenaston	Richard Bounds
Milo Koretsky	Mark Yahnke	Arzu Kanka
Steve Russek	Christopher Lee	David Halat
Adam Aylor	Kurt Scheinpflug	Haiyan Mao
Lisa Lobree	Christopher Miller	Lena Funke
		Alicia Lund
		Current Group
		Sophia Fricke
		Ah-Young Song
		Vincent Allen
		Anika Harkins
		Noella D'Souza
		Chongwei Zhang
		Summit Shrestha
		Wern Ng

thermodynamics, mathematical modeling, transport phenomena, and materials science; yet he is bridging the gap between theoretical knowledge and real-world engineering challenges, for example by memorably riding a high-performance Yamaha YZF750 Sportbike motorcycle into the lecture hall to talk about the many materials making up these technologies we take for granted. He even developed and taught a freshman seminar on science fiction and American culture (*"Whose Science, Whose Fiction? Exploring America's Imagination via SciFi"*) – of course it had a focus on books, short stories, but what student wouldn't love to add the important media of TV shows and movies?

Jeff in our conversations draws parallels between mentoring graduate students and postdocs (see Table 1) as a reflection of raising kids – emphasizing guidance without stifling creative independence. He describes his courses as a progression of expanding intellectual boundaries. For example, his introductory chemical engineering course begins with assigned readings and structured homework but to be timely and "on brand" with today's students, it wraps up with open-ended design projects that include YouTube videos. The early issues of *Catalyst* magazine, a journal printed by the College of Chemistry at Berkeley, contain his editorials on, for example, how elementary USA schools unfortunately neglect power tools (in grades 1-6 education)!

Possibly my own favorite story, Jeff is known for posting the most humorous and irreverent student reviews outside his office. His ability to embrace (and publicly display) these reviews speaks to his character, and his ability to take teaching seriously, while highlighting in a Joseph-Heller-like farcical and comic style, some of the absurdity of our profession.

His motivation for effective mentorship stems from his desire to see his students succeed, often viewing their accomplishments as a significant source of encouragement and personal fulfillment. In interview after interview, it becomes clear that Jeff deeply appreciates the enriching experiences and personal connections he has built with his students and postdocs (and colleagues!), and he regularly notes that their success represents one of his greatest professional achievements.



Fig. 4. – Bernhard, Jeff, and Karen (Reimer) in Germany circa 2016, during one of their many exchanges, creativity inspired by adult beverages.

6. Well-spoken

The way I would describe Jeff is having the ability to communicate, that he is tremendously well spoken, in hearing his choice of words. He has carved out in his own personal way, his own "bright spot" in science. Let me explain ...

Hearing his choice of words – you know, he reads quite a bit, and not just scientific works. He has incredible skill to make people feel comfortable. Just think of Jeff's lecture introductions, how they go in some unpredictable, orthogonal direction. How about his attention-demanding approaches to introducing the Vaughan lecture?

My earliest memory of Jeff was at a Rocky Mountain Conference (RMC) meeting in the early 2000's. "Famous Jeff" asked to come to Aachen to spend a sabbatical in my group, which was delightful to me. Since then, we had so many personal and family events over the years (see Fig. 4, including his wife, Karen Reimer). It's this combination of scientific work and the importance of family that really stuck with me.

One of his noteworthy achievements will always be his porous media work, what he did for CO₂ capture, even in a time of significant political bias. His work led to a very important book, as many will know. For Jeff, this topic was always personal – asking always, "do we do enough???"

In my group, we benefited a lot from his scientific contributions. He took two sabbaticals with us, and we began an 'Aachen – California network of students and staff exchanges' (ACalNet). This was interdisciplinary but involved mostly chemical engineers, not just from Berkeley, but also scientists from UCSB and University of California, Los Angeles (UCLA). You can imagine how that would land – students getting to go to California from Germany and vice versa! This was an exceptionally creative time for me and my group. Initially, it appeared to be a call for a minor funding opportunity, but it ended up much bigger, becoming a university-level endeavor for a number of years that generated multiple collaborations by visiting staff and exchanging the best students for part-time work in the labs of a partner across the Atlantic. I think back on those many impactful encounters, not just publications, MOFs, MOUSE, and porous media, but deeper discussions and most enjoyable family ties.

Once retired in Germany, the style of work changes, but the ties remain and grow including other groups today like Matt Augustine's and Sophia Fricke's. I certainly hope that they survive and that international exchanges will remain possible in our shaky times these days, because they are so important.

Hopefully, sometime soon we can hike again the Alps in Hinterbichl or some other place where the mountains are high, and food and beer are good. – Prof. Em. Bernhard Blümich.



Fig. 5. – Jeff and Karen Reimer together in the British Virgin Islands (2022), in Technicolor.



Fig. 6. – A familiar sight at the so many meetings, Jeff and a colleague chatting; here with Paul Callaghan – who would inspire Jeff to study liquid crystalline polymers. Jeff would later give the Callaghan Lecture at the Quebec City ICMRM meeting in 2017.

7. Friends, family, and collaborators

Throughout the interviews with Jeff and his colleagues, the value of relationships came up repeatedly, with collaborators and former students, who became friends, and family who have contributed to Jeff's career.

What came through with clarity, is how Jeff deeply values those relationships and how these have significantly enriched his life.

Family: an important thread throughout the conversations was the role of family in Jeff's career. Jeff shared how important his family's steadfast support and encouragement buttressed his success. His wife, Karen (see Fig. 5), helped him through multiple challenging periods of

his career, including late nights spent revising grant proposals. He recounted a story of a family vacation, where an impromptu discussion about science with his kids about liquid nitrogen and temperature, reminded him of that joy of discovery and learning.

Friends: Jeff also spoke with gratitude and fondness about a close-knit group of friends who provide a sense of balance to his absorbing professional life. He is devoted to time away with family and friends for an annual camping trip, and yet even one of those trips turned into an impromptu brainstorming session, resulting in an idea that was later incorporated into a research project. Even friendships aren't immune from having the capacity to contribute to both his personal well-being and professional creativity.

Colleagues: Reflecting on his colleagues, Jeff spoke about how supportive so many have been to him over the years. There have been colleagues who introduced him to innovative NMR techniques or ideas that have led to groundbreaking projects (see Fig. 6).

He recognized the generosity of former advisors' (now colleagues) mentorship – remarking warmly about how transformative his time at Xerox PARC and IBM Yorktown informed his professional worldview, how industry is filled with truly gifted scientists and engineers, and the generosity of their time and encouragement.

Then there were colleagues, like Profs. Rachel Siegelman and Alex Bell, who dedicated time and thoughtfulness to several award nomination packages over the years. Remarkably, Jeff related what must be an only-in-Berkeley anecdote, about attending a reception for Omar Yaghi's Nobel Prize, where he got to overhear kind discussions and speculation about the “next” Berkeley Nobel Prize winner (and yes, Nobel Laureate Parking Permit recipient). Supportive colleagues were called out repeatedly in these interviews, along with how very crucial these colleagues have been to his well-being and success.

8. Conclusion

What emerges from these many hours of conversation, and from the recollections gathered here, is a portrait of a scientist who defies easy categorization. Jeff Reimer is a chemist who built a career in chemical engineering; an experimentalist who thought like a theorist; a prolific researcher who considered teaching his most important work. He acquired magnets off the backs of pickup trucks and rode motorcycles into lecture halls, not for spectacle, but because the boundary between curiosity and demonstration was, for him, essentially invisible. He mentored students with the patience of someone who understood that becoming a scientist is also a human process — one that involves finding your footing in new communities, learning to trust your instincts, and discovering what questions are worth your life's work. He built collaborations across continents and decades, and the network of people who count themselves shaped by his generosity is, by any measure, extraordinary. The high regard and deep affection expressed by so many are not incidental to Jeff's scientific legacy — they are inseparable from it. We are, as scientists and as people, better for having worked beside him.

Acknowledgement

This work was created through a series of oral interviews with Bernhard Blümich, Cecil Dybowski, Velencia Witherspoon, and multiple interviews with Jeff Reimer. All involved were able to make editorial changes to the sections presented as boxes from interviews. Jeff Reimer also made minor editorial changes and provided informal fact-checking. All photos were contributed by Jeff and co-authors.

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Education

PhD in Chemistry, California Institute of Technology, October 1980.
BS in Chemistry with Honors, University of California Santa Barbara, 1976.

Employment

Professor of the Graduate School, University of California Berkeley, July 2022 – present.

Professor, University of California Berkeley, July 1994 – 2022.

Chair, Department of Chemical Engineering, UC Berkeley, 2006 – 2011, 2013–2022.

Mercator Professor of the Deutsche Forschungsgemeinschaft, RWTH Aachen 2006.

Associate Dean, Graduate Division, University of California, Berkeley, 2000 – 2005.

Chair, Applied Science & Technology Group, UC Berkeley, 1999 – 2000.

Faculty Scientist, Ernest O. Lawrence Berkeley National Laboratory, 1984 – present.

Assistant, Associate Professor, University of California at Berkeley, 1982 – 1988, 1988 – 1994.

Postdoctoral Fellow, IBM T. J. Watson Laboratories, October 1980 – August 1982.

Honors

2023 Warren K. Lewis Award for Chemical Engineering Education.

2022 University of California Berkeley Citation.

2022 G. H. Lewis Lectureship, UC Berkeley.

2017 Paul T. Callaghan Lecture of the International Society for Magnetic Resonance.

2015 – 2016 Humboldt Research Award, RWTH Aachen, Germany.

2013 Fellow, International Society of Magnetic Resonance.
2012 – 2022C. Judson King Distinguished Professor, UC Berkeley.
2012 EAS Award for Outstanding Achievements in Magnetic Resonance, Eastern Anal. Society.
2010 Fellow, American Physical Society.
2009 Fellow, American Association for the Advancement of Science.
2006 – 2011, 2013 – 2022, Warren and Katharine Schlinger Distinguished Professor, UC Berkeley.
2008 Otto M. Smith Lectureship, Oklahoma State University.
2002 U. C. Berkeley Distinguished Teaching Award
2002 R. W. Vaughan Lectureship, Rocky Mountain Conference on Applied Spectroscopy.
2000 and 2015 Chemical Engineering Departmental Teaching Award, UC Berkeley.
1998 The Donald Sterling Noyce Prize for Excellence in Undergraduate Teaching, UC Berkeley.
1997–1998 AIChE Award for Chem Eng Excellence in Academic Teaching, NorCal Section.
1987–1989 Camille and Henry Dreyfus Teacher-Scholar Award
1987 AT&T Foundation Award
1985 – 1990 NSF Presidential Young Investigator Award
1984 IBM Faculty Development Award

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