Catalyst Application

Master: Steven J. Sibener, University of Chicago
Nanoscience and Materials Chemistry

The Catalyst Program:

You are invited to apply for the Catalyst Program. The Catalyst program is designed to provide support for transforming students with demonstrated talents in science into the next generation of innovators by integrating the creativity of eminent scholars (*Masters*), rising stars in the field (*Associates*), and high-achieving adolescents who demonstrate exceptional abilities (*Scholars*). *Participation in Catalyst requires no financial investment on the part of Scholars or their families.*

- The Camille and Henry Dreyfus Foundation and the American Psychological Association have assembled a group of highly accomplished chemical scientists ("Masters") who also have strong abilities to serve as Scholar mentors.

- For a week beginning June 27, 2008, Scholars chosen for the Catalyst Program will study with their Masters at Williams College in Williamstown, MA and initiate a project together. Each Master will work with a group of 3-4 Scholars. Scholars will explore in depth areas of interest as well as be exposed to other disciplines through group conversations, lunchtime Q&A sessions, Master presentations and cultural events.

- During the academic year that follows, each Scholar will complete a project initiated at the summit with guidance from the Master.

- In late June-early July of 2009 all Catalyst participants will return to Williams College for a reunion weekend to present the results of their work to the new class of Catalyst participants.

Part I. Student Information

Name—Last, First, MI:

Gender—M/F:

Current grade level in school:

Age:

Address—Street, City, State, Zip Code:

Home phone:

Cell phone:

Email:

Part II. Project Overview: Molecular-Level Behavior in Physical and Biological Systems

Professor Sibener will try to convey the magnificent opportunities that exist in science occurring at the interdisciplinary boundaries between chemistry, physics and biology. He will also emphasize that at this moment we are poised to understand, due to recent advances in experimental and numerical methods, the complex behavior of molecular-level systems. He will discuss concepts and tools from modern chemistry and physics coupled with nanoscience techniques to conceptualize future opportunities in these areas of endeavor. Both fundamental and applied aspects will be highlighted with respect to new opportunities in materials design, chemical catalysis, and understanding structure-function relationships in chemistry and biology. Current topics such as energy harvesting and storage, as well as climate change, will also be explored with a focus on the role that scientists play in shaping national and international policy using fact-driven analyses.

Please respond to the following questions in not more that 1-2 paragraphs:

1. Please list and briefly describe hobbies or interests you pursue that relate in any way to science.

2. Please list any honors or awards you have received that are in any way connected to science. It would be helpful if you could provide the date and a brief explanation for each. If you have one, please attach a Curriculum Vita or resume.

3. Have you completed any projects in any subject that have extended beyond one semester? If so, please describe. You may also describe any summer enrichment or research activities as part of your response to this question.

4. Do you enjoy working with your hands, if so, can you describe an effort you have made to build something to meet a need?

5. Write a brief letter of introduction to Dr. Sibener (see bio below), including information about what attracts you to this program, what you would like to learn from this mentorship in Chemical Science and what you would like to accomplish over the course of the Catalyst summit and post-summit experiences. You can also include the following information - What are your career dreams? Do you envision yourself as a research scientist, engineer, physician, entrepreneur, or political activist involving scientific issues? Why? If so, is there a particular sub-specialty or area in Science that you are most interested in?

6. Modern scientific research, regardless of its specific focus, utilizes the very powerful insights that come from the combination of laboratory experimentation, fundamental theory, and numerical simulation. Which of these areas describe the road that you may take as you progress with your scientific career? How do you view the interaction of these three approaches as being optimally used to further human knowledge?

Dr. Sibener may contact you by phone if he has any questions about this application.

Steven J. Sibener

Carl William Eisendrath Professor
Department of Chemistry and The James Franck Institute
The University of Chicago

Steven J. Sibener has made seminal contributions to chemical physics, surface and materials chemistry, and nanoscience. He has conducted pioneering molecular beam studies of gas-phase combustion processes, mechanistic studies of interfacial catalytic reactions, and precision measurements on the atomic-level dynamics of interfaces. In particular, his innovative use of sophisticated gas-surface scattering instruments and atomic-resolution scanning probe microscopes combined with appropriate theory and numerical simulations has led to advances in these areas of research. His program is now also examining molecular self-organization, polymer dynamics, atomically-resolved studies of molecular reactivity, and nanoscience projects that may lead to the development of novel functional materials.

Steve accepted appointment to the University of Chicago faculty in 1979 while still a graduate student at Berkeley. He then spent a postdoctoral year of study at Bell Laboratories before settling in Chicago in Autumn, 1980. Sibener has also been twice elected a Visiting Fellow of the Joint Institute for Laboratory Astrophysics (JILA) located at the University of Colorado in Boulder. At Chicago, he has served as mentor for many postdoctoral fellows, graduate students, undergraduates, and is involved in K-12 scientific outreach involving neighboring schools on the south side of Chicago.

He has served in many leadership positions at the University and elsewhere: he was Director of the University's Materials Research Science and Engineering Center, Director of the Multi-University Center for Materials Chemistry in the Space Environment, and, as Director of the university's interdisciplinary efforts within The James Franck Institute, played a key role in the conceptualization and design and of the university's new interdisciplinary research facility, the Gordon Center for Integrative Science. He has also served as Chairman of the Division of Chemical Physics of the American Physical Society.

Steve's honors include the Marlow Medal of the Royal Society of Chemistry, an Alfred P. Sloan Foundation research fellowship, a Camille and Henry Dreyfus Young Faculty Award in Chemistry, and an IBM Faculty Development Award. He is an elected Fellow of the American Physical Society and the American Association for the Advancement of Science. He is a Phi Beta Kappa graduate of The University of Rochester, where he received bachelor's degrees, with honors, in chemistry and physics. He earned his M.S. and Ph.D. degrees in chemistry from the University of California, Berkeley under the guidance of Nobel Laureate Yuan T. Lee.