

Princeton University

HONORS FACULTY MEMBERS
RECEIVING EMERITUS STATUS



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The biographical sketches were written by staff and colleagues in the departments of those honored.

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WILLIAM BAILEY RUSSEL



William Bailey Russel, the Arthur W. Marks '19 Professor of chemical and biological engineering, transferred to emeritus status on February 1, 2017, after forty three years on the Princeton University faculty.

Bill was born in Corpus Christi, Texas, in 1945. He received B.A. and M.ChE. degrees in chemical engineering from Rice University in 1969. He then moved to Palo Alto, California, to pursue a Ph.D. in chemical engineering at Stanford University, where he worked with Andreas Acrivos on the “effective moduli of composite materials.” He was awarded his doctoral degree in 1973 and was appointed an assistant professor in the chemical engineering department of Princeton University in 1974. He was promoted to associate professor in 1979, to professor in 1983, and became chair of the chemical engineering department in 1987.

After serving nine years as chair, Bill went on to serve as director of the Princeton Materials Institute (PMI) in 1996–1998, and principal investigator for the Princeton Center for Complex Materials (PCCM) and the National Science Foundation-sponsored Materials Research Science and Engineering Center that continues to this day. Both PMI and PCCM brought together researchers from a range of science and engineering departments across campus for teaching and research, and PCCM helped to launch the careers of many Princeton faculty. Following a brief stint back in chemical engineering (which included a semester as acting chair), Bill became dean of the Graduate School (the first engineer to be appointed to that position, but not the last!). Some of the most notable broad impacts of Bill’s tenure as dean of Princeton’s Graduate School have been the establishment of an annual reenrollment process, the creation of the “Dissertation Completion Enrollment” (DCE) status, a concerted effort to increase diversity in the graduate student body, and planning and construction of the Lakeside apartments.

Bill has a strong sense of responsibility to the broader profession as well, as evinced through his outstanding, substantive, and dedicated leadership in the Society of Rheology (twelve years of

service including serving as president from 2001–03), and service on committees for the American Institute of Chemical Engineers (AIChE), American Chemical Society, Materials Research Society, National Academy of Engineering, and on advisory boards of academic departments and units.

Bill's long and highly distinguished research career has focused on the phase behavior, structure, and dynamics of colloidal systems. Early in his career, Bill proposed an elegant and insightful theory for polymer-induced phase separations in colloidal suspensions; by successfully explaining the physical basis for this phenomenon, it has become the basis for the rational engineering design of polymer-stabilized colloidal suspensions, with applications ranging from pollution prevention to the formulation of paints and cosmetics. More recently, Bill's group performed definitive experiments, both in normal gravity and in microgravity, using temperature, electrical fields, and gravity to control the structure, growth kinetics, and density of colloidal crystals. Key results include the determination of the equation of state of hard spheres across the fluid-crystal transition, the detailed measurement of nucleation and growth rates, and the determination of elastic constants for hard sphere crystals. Another area in which Bill has made major contributions is the rheology, consolidation, and (most recently) collapse of colloidal gels. The implications and applications of these studies include the formulation of paints, protein separations, and industrial waste treatment. The distinguishing characteristic of Bill's numerous technical accomplishments is their solid grounding in theory (fluid mechanics, transport phenomena, and statistical mechanics), combined with the use of a wide array of experimental methods (rheo-optics, microscopy, dynamic light scattering, electrophoresis, and dielectric spectroscopy).

In addition to his approximately 200 technical articles in peer-reviewed journals, Bill also has several books to his credit. His magnum opus is the book *Colloidal Dispersions* with Princeton colleagues D. A. Saville and W. R. Schowalter, published by Cambridge University Press in 1989 and reprinted as a paperback in 1991. This textbook is required reading for any serious practitioner of colloid science, rheology, and more recently, nanoscience and technology, and is widely considered to be the definitive reference in the field, even twenty-five years after publication. In addition, his lectures as an Olaf A. Hougen Visiting Professor at the Department

of Chemical Engineering, University of Wisconsin – Madison, were published as a monograph in 1987, and his Debye lecture notes at the Utrecht University were published as a monograph in 2001. He is also the co-inventor on a U.S. patent issued in 2009.

An exemplary mentor, Bill was the Ph.D. adviser or co-adviser for forty doctoral students, including several who went on to become highly respected leaders in academia and industry. For example, Alice Gast, who received her Ph.D. with Bill in 1984 (co-advised with Carol Hall), is currently president of Imperial College London, following a position as president of Lehigh University.

His many awards and honors include election to the National Academy of Engineering in 1992, and to the American Academy of Arts and Sciences in 1995. He has also been elected a fellow of the American Association for the Advancement of Science (2012), and been awarded the William H. Walker Award for Excellence in Contributions to Chemical Engineering Literature (1992) and the Alpha Chi Sigma Award for Chemical Engineering Research (2010) from the American Institute of Chemical Engineers.

Following Bill's transfer to emeritus status, we look forward to his continuing involvement with the department and the University.