

# 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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# ILHAN A. AKSAY



**I**lhan A. Aksay, the Pomeroy and Betty Perry Smith Professor in Engineering, and professor of chemical and biological engineering, will transfer to emeritus status at the end of the academic year, after 26 years on the Princeton University faculty.

Ilhan was born in Istanbul, Turkey, on May 27, 1944. He moved to the U.S. for his undergraduate degree in ceramic engineering, which he completed in 1967 at the University of Washington in Seattle. He continued his studies at the University of California-Berkeley, where he received his master's and Ph.D., both in materials science and engineering, in 1969 and 1973, respectively. After postdoctoral work at the Lawrence Berkeley Laboratory and a two-year stay at the Xerox Research Center in Webster, New York, Ilhan moved back to Turkey for his first faculty appointment in the Department of Metallurgical Engineering, Middle East Technical University, in Ankara. He rose through the ranks of assistant and associate professor, and returned to the U.S. in 1982 as an associate professor in the Department of Materials Science and Engineering at his alma mater, the University of Washington. He was appointed director of the Advanced Ceramic Materials Laboratory there in 1984, was promoted to professor in 1985, and became director of the Advanced Materials Technology Center in 1988. In 1992, he joined the Princeton faculty as professor in the (then called) Department of Chemical Engineering. He was appointed the Pomeroy and Betty Perry Smith Professor in Engineering in 2017.

Ilhan has a history of groundbreaking research throughout his career. He was the principal force behind the measurement and understanding of phase equilibria in the  $\text{Al}_2\text{O}_3\text{-SiO}_2$  system in the 1970s, colloidal processing of ceramics in the 1980s, and bio-inspired processing of materials through self-assembly in the 1990s. In recent years, an invention led by Ilhan and his Princeton colleague, Robert Prud'homme, to produce functionalized graphene sheets, focused Ilhan's attention on fundamental studies of the properties of these systems and their utility in engineering applications. This work places him among the most innovative contributors to the science and technology of materials processing. His work has been cited more than 34,000 times to date by his peers based on information from the Web of Science.

Ilhan's innovative work on the science of materials processing goes well beyond scientific publications in leading journals. Not only the

work on functionalized graphene, but many of his scientific studies have resulted in patents (more than 50 U.S. patents issued on key aspects of his work) and been licensed by companies such as Dow Chemical, St. Gobain, Praxair, and Vorbeck Materials Corporation. His depth of understanding of fundamental issues and an innovative approach to problem solving have enabled him to tackle challenging problems in important emerging materials technology areas such as ceramic armor and high-temperature superconductors. For instance, when high-temperature ceramic superconductors were discovered in 1987, there was a critical need to develop efficient processes for producing powders that could be used to manufacture these materials in a commercially viable way. His research on the processing of powders by spray pyrolysis was the principal process licensed and used by Praxair Specialty Ceramics in the production of superconducting ceramic powders. Praxair now employs this technique to produce nano-sized metal oxide particles to produce myriad compositions important to the manufacture of gas separation membranes.

Ilhan has been recognized with numerous honors and awards over the years, including the Richard M. Fulrath Award from the American Ceramic Society (1987), the Puget Sound Academic Engineer of the Year Award, from the state of Washington (1988), the Charles M. A. Stine Award from the American Institute of Chemical Engineers (1997), the National (Turkish) Medal of Science (2001), and has been named a Highly Cited Scientist by the Institute of Scientific Information (2005). He has been elected a fellow of the American Ceramic Society (1990), the American Association for the Advancement of Science (2012), and the National Academy of Inventors (2014). He was elected a member of the National Academy of Engineering in 2010. In the same year, he was elected a member of the Turkish Academy of Sciences (TÜBA), but resigned in 2011 as TÜBA lost its self-governance status. He is a member of the Science Academy (Turkey). He has given numerous named lectures at academic institutions worldwide, plenary and invited lectures at technical conferences, and was a visiting professor at the École Normale Supérieure Paris-Saclay (formerly ENS Cachan) in France in 2010.

During his Princeton years, Ilhan has advised or co-advised 17 Ph.D. students and has participated in thesis committees for many more. Many of his former students have gone on to prominent positions in academia and industry. He served as the senior thesis adviser of nearly 60 undergraduates. He taught courses on thermodynamics, synthesis and processing of ceramic materials, biologically inspired materials, as well as a freshman seminar titled “Materials World,” and supervised the

Chemical Engineering Laboratory. He was responsible for the design and funding of the “Materials World” mural decorating the interior wall near the entrance of the G-wing of Princeton’s Engineering Quad.

Ilhan has served in many professional organizations, most recently as a member of the National Academy of Sciences Committee on Science and Technology for Defense Warning, and as a Review/Visiting Committee Member for the Aerospace Department of the Technical University of Delft and the Department of Materials of ETH Zürich. He is editor of the *Journal of Ceramic Processing Research* and associate editor of the *Journal of Nanoparticle Research*. He was a consulting editor of the *American Institute of Chemical Engineers Journal* and has served on editorial and advisory boards of many international journals.

Even though he is transitioning to emeritus status, we are hopeful that Ilhan will continue to have an active presence on campus and in the department for many years to come, perhaps facilitated by the close proximity to his beautiful new Princeton home.