SIA NEMAT-NASSER

1936–2021

Elected in 2001

"For pioneering micromechanical modeling and novel experimental evaluations of the responses and failure of modes of heterogeneous solids and structures."

BY ALBERT P. PISANO

SIAVOUCHE NEMAT-NASSER, renowned theoretical and experimental materials scientist, passed away January 4, 2021, from complications of acute myeloid leukemia. He was 84 years old.

He was a Distinguished Professor of Mechanics and Materials in the Department of Mechanical and Aerospace Engineering at the University of California–San Diego Jacobs School of Engineering. He officially retired in 2019 but remained active as a researcher through his Center of Excellence for Advanced Materials.

Sia was born April 14, 1936, in Tehran, Iran, and immigrated to the United States in 1958 to complete his undergraduate degree in civil engineering at Sacramento State College (now University). He earned his MS (1961) and PhD (1964) degrees in structural mechanics from the University of California, Berkeley.

He joined the UC San Diego faculty twice, first from 1966 to 1970. From there he went on to a brilliant 15-year career at Northwestern University, with a one-year visiting professorship at the the Technical University of Denmark (1972–73), before returning in 1985 to UCSD, where he set out to create a materials science program.

At UCSD he helped recruit young, talented scholars and then served as founding director of the university's Materials Science and Engineering Program, a globally recognized, integrated campuswide graduate degree program. He also initiated a program on the mechanical behavior of materials. The two programs became magnets for researchers from around the world, and earned both broad community recognition and support from the National Science Foundation for UCSD's Institute for Mechanics and Materials, for which he served as codirector and then director from 1992 to 2000.

Sia studied how materials fail and why. Renowned as both a strong theoretician and innovative experimentalist, he examined a broad range of materials: ceramics, ceramic composites, high-strength alloys and superalloys, rocks and geomaterials, and advanced metallic and polymeric composites with electromagnetic, self-healing, and self-sensing functionality; ionic polymer-metal composites as soft actuators/sensors; and shape-memory alloys. His work enabled the design of more resistant, useful, and safer materials for a variety of applications, from civil infrastructure to space stations (to withstand meteorite impacts), biotechnology, and defense. He and his research teams also developed or codeveloped many of the novel research instruments used in their laboratories.

Over the course of his prolific academic career, Nemat-Nasser published more than 500 scientific articles, which have over 33,000 citations according to Google Scholar. In addition, he was founding editor in chief of the journal *Mechanics of Materials*, a position he held for 37 years until his retirement. He also authored, coauthored, or edited over 20 books and proceedings, including two book series, *Mechanics Today* (Pergamon) and *Mechanics of Elastic and Inelastic Solids* (Springer). Notable scholarly texts include *Micromechanics: Overall Properties of Heterogeneous Materials* (with Muneo Hori; Elsevier, 1999), and *Plasticity: A Treatise on Finite Deformation of Heterogeneous Inelastic Materials* (Cambridge University Press, 2004).

Teaching and mentoring were crucial to Nemat-Nasser. He taught undergraduate courses in mechanics and mathematics throughout his career, and advised more than 70 PhD students

and 30 postdoctoral researchers. In a 2008 UCSD TV video segment he expressed his passion for teaching and training future generations of researchers.[1] He relished working with graduate students who would develop into intellectual partners from whom he could learn and who have often gone on to become leaders in the field of mechanics. In 2015 he received the UCSD Academic Senate Distinguished Teaching Award for his highly effective teaching of undergraduate students, using an approach that integrated inventive and alternative teaching methods.

Among his numerous honors, Sia was elected to the NAE (2001) and he received the highest awards in mechanics: from the American Society of Mechanical Engineers (ASME), the Timoshenko Medal (2008) and ASME Medal (2013); and from the American Society of Civil Engineers (ASCE) the Theodore von Kármán Medal in Engineering Mechanics (2008). The Society of Engineering Science (SES) selected him for the William Prager Medal (2002), which is presented for outstanding research contributions in theoretical or experimental solid mechanics or both. And the Society for Experimental Mechanics (SEM) honored him with the Lazan Award (2007), presented for outstanding original technical contributions to experimental mechanics; the Murray Lecture (2009); and the Frocht Award (2012), presented for outstanding achievement as an educator in the field of experimental mechanics. Academic awards bearing his name were created by both ASME, focused on underrepresented minorities and women in engineering, and SEM.

In addition to his illustrious UCSD contributions, Nemat-Nasser was an active member of ASME, ASCE, SEM, SES, the American Academy of Mechanics, American Society for Metals (ASM) International, the Minerals, Metals and Materials Society (TMS), and the World Innovation Foundation, among others. He also served on the Panel on Air and Ground

[1] The video is available at https://www.youtube.com/watch?v=okl1pdnT_50; the roughly 13-minute conversation with Dr. Nemat-Nasser, including demonstrations of his work, begins at about minute 23.

Vehicle Technology (2003–06) for the National Academies' Army Research Laboratory Technical Assessment Board and cochaired the NAE's Mechanical Engineering Search Committee (2007–10).

Sia was proud of his Persian heritage and eager to share its richness. He was fond of the Persian poets Ferdowsi and Omar Khayyam, who was also a great mathematician and astronomer. He not only personally translated poetry from Farsi to English but also wrote his own poetry in Farsi, illustrated it, and translated it into English.

In 2016 he and his wife Éva established the Roghieh Chehre-Azad Distinguished Professorship in the UCSD Division of Arts and Humanities to foster new projects and future works exploring the music, art, literature, and history of Persian culture. In establishing the gift, Sia explained that it honored his mother, Chehre-Azad, a well-known actor in Iran who pursued her passion of acting at great personal risk when it was taboo in that country for women to perform on stage.

Sia was a person of great energy, discipline, and dedication. He swam for an hour every day until 2018. For many years he went to La Jolla Cove at night and swam alone in the ocean, to Éva's dismay.

Sia is survived by Éva; their children Michaela, Elizabeth, Katherine, David, Syrus, and Shiba; and four grandchildren.