



Professor Anthony G. Evans (1942 – 2009)

From the American Ceramics Society website: <http://ceramics.org/uncategorized/anthony-tony-g-evans>:

ACerS leaders and staff recently were saddened learn that Distinguished Life Member and former Society vice president, Tony Evans died after a year-long bout with cancer.

Fred Lange, also an ACerS DLM and friend of Evans, provided the following information:

Anthony Glyn Evans, a Welshman, known as 'Tony' to all of us, died at home, in the early morning of September 9th, 2009 after a year long battle with cancer. He left behind his life-long partner and wife, Trisha, three daughters, Samantha, Polly, and Jay, and a host of friends/colleagues who miss him terribly. His death devastated our community. A number of friends summed up our loss with, "Our world just lost a big chunk of the stuff that makes it interesting." (Brian Cox), and "It's as if the power went out." (Brian Lawn).

Tony's innovative contributions to materials were enormous, and were recognized with the highest accolades in science and engineering, including being a Fellow of the Royal Society and Fellow of the Royal Society of Engineering on the eastern side of the Atlantic, and members of the National Academy of Science and National Academy of Engineering on the western side.

Tony started his scientific life at Imperial College studying dislocation motion in the fluorite structure, with Peter Pratt, his advisor. Typical of his continued life work, Tony explained this motion, better known at the time for metals, and not ceramics, with mathematics, using illustrations to help the reader understand the math. After graduate studies, he was employed at the Atomic Energy Research Establishment at Harwell, Europe's most prestigious and best equipped laboratory, where he worked with Roger Davidge on concepts of ceramic fracture. At Harwell, Tony and Roger introduced fracture mechanics concepts that were well known for metal mechanics, but poorly understood in the ceramics community. After a short period at UCLA with Alan Tetelman, the guru of fracture mechanics at that time, he moved to the National Bureau of Standards to work with Shelley Wiederhorn, who had pioneered the effect of water on subcritical crack growth in glass. Using his mathematical talents, Tony developed analytical concepts to predict failure life-time with subcritical crack growth data. These life-time predictions were later developed to include the statistics of fracture and proof testing, enabling engineers to use structural, ceramic components with greater reliability.

When Tony moved back to the west coast to work at Rockwell Science Center, he initiated a collaborative study concerning the detection of strength limiting flaws in ceramics. This collaboration became the first of many that followed. Regarding these collaborations, John Hutchinson noted at his 60th Birthday Roast at Schloss Solitude, "On one of his weekly visits to Washington, DC, Evans overheard advanced information circulating in the halls of power to the effect that 'certain types of dislocations may be redundant and troublesome to cheap, lightweight structures' of interest to both DARPA and ONR. Upon his return home, Evans assembled a team of international experts who volunteered to accept funding to work on this national priority." The subject of these collaborations, which would last for years, ranged from ceramic composites, lightweight metallic structures, wing warping, armor, and thermal barrier coatings. Tony's modus operandi was to hold a yearly workshop that defined, by consensus, the next year's objectives. Many problems were defined and solved.

After Rockwell, Tony moved to successive universities, including Berkeley, then UCSB, where he was the inaugural chair of the Materials Department, then Harvard, Princeton and back again to UCSB. He graduated a number of students who have carried on Tony's teachings, and have made fundamental contributions themselves.

For our community, Tony was truly a ‘once in a lifetime event.’

Another ACerS DLM, Arthur Heuer, was a long-time acquaintance who first met Evans on the day Heuer defended his Ph.D. thesis. He praised his colleague as being “one of the top two or three materials scientist of our time - or any time. He was one of the very few people who are simultaneously well known among the ceramics, metallurgy and mechanics communities. He did pioneering work in exploiting the interface between mechanical and materials science. His style of work was to assemble a diverse team of experts from academia and industry, and this style influenced the way the field has developed.”

Northwestern University professor Katherine Faber, a former Evans’ grad student, agreed with Heuer, noting, “Tony had the ability to assemble extraordinary teams of scholars to go after problems of technological and scientific import. A case in point is the topic of thermal barrier coating systems where he amassed experts in phase equilibria for the design of new coating materials, processing of superalloys and ceramic coatings, mechanical and microstructural characterization, and mechanics for the analysis of various failure modes. This same philosophy was apparent in his groundbreaking work on toughening mechanisms, ceramic matrix composites, indentation fracture and thin films. In each case Tony was the magnet.”

Faber also said Evans will be remembered for his talent in the classroom. “He had the exceptional knack of making complex ideas seem simple, and has been a role model for many of us who followed academic paths.”

HONORS AND AWARDS

2006 Fellow Royal Academy of Engineering (London)
2005 Fellow, National Academy of Science
2005 Gold Medal (ASM International)
2003 Nadai Medal (American Society of Mechanical Engineers)
2002 Humboldt Research Award for Senior U.S. Scientists (Germany)
2001 Fellow, Royal Society (London)
2001 M ellor Memorial Lecturer (The Institute of Materials, U.K.)
2000 Turnbull Award (Materials Research Society)
2000 Fellow Academy of Arts and Sciences
2000 Distinguished Life Member (American Ceramic Society)
1998 Peterson Award (Society for Experimental Mechanics)
1997 Fellow, National Academy of Engineering
1994 Griffith Medal and Prize (The Institute of Materials, U.K.)
1993 Honorary Fellow (International Congress on Fracture)
1988 Orton Lecture (American Ceramic Society)
1988 John Jeppson Medal (American Ceramic Society)
1986 Hobart N. Kraner Award (American Ceramic Society)
1984 Clyde Distinguished Professor (University of Utah)
1983 Van Horne Distinguished Lecturer (Case Western Reserve University)
1980 Robert Sosman Award (American Ceramic Society)
1979 Richard M. Fulrath Award (American Ceramic Society)
1974 Ross Coffin Purdy Award (American Ceramic Society)
1967 Matthey Prize (Imperial College)

A Tribute to Anthony G. Evans: Materials Scientist and Engineer December; 4, 1942–September 9, 2009 by John W. Hutchinson, January 4, 2011, published in J. Am. Ceram. Soc., Vol. 94, No. S1, pp. S1-S2, 2011, DOI: 10.1111/j.1551-2916.2011.04592.x

THIS special issue of the Journal of the American Ceramics Society brings together papers written by some of the many colleagues who have worked with Tony Evans over his career. The issue itself reflects the extraordinary breadth of Evans' scientific interests. This brief Tribute is an attempt to capture in a few words Tony Evans' remarkable influence and contribution to materials science and more broadly to engineering science. The task would be more daunting were it not for the testimony to Tony Evans in celebration of his 65th birthday by A. Heuer (Int. J. Mat. Res. 98 (2007) 1168–1169) and an obituary by N. A. Fleck, which appeared in the November 29, 2009 issue of the Guardian newspaper.

Anthony G. Evans was one of the most influential materials scientists and materials engineers of his generation. He had no rival when it came to the grasp of the underlying fundamentals of material behavior coupled with an extraordinary ability to focus his attention and to inspire and lead collaborative efforts. Evans was born and raised in Porthcawl, Wales to William Glyn and Annie May Evans. He met his wife, Trisha, in their hometown and they were married in 1964. Trisha and their daughters and grandchildren survive Tony. After obtaining BSc (1964) and PhD (1967) degrees in metallurgy at Imperial College, London, Evans began work in 1967 as a ceramist at the Atomic Energy Research Establishment, Harwell. Following a sabbatical period at UCLA, Evans worked at the National Bureau of Standards from 1971 to 1974 and then served as a group leader at the Rockwell International Science Center from 1974 to 1978. In 1978 he joined the faculty of the Department of Materials Science and Mineral Engineering, University of California, Berkeley, where he remained until 1985. During these years the emphasis of much of Evans' research was on ceramics and he began his long association with the American Ceramics Society. In 1985 he moved to the Santa Barbara campus of the University of California as the Alcoa Professor. Evans was the founding chair of the Materials Department at UCSB (1985–1991) which would become one of the leading materials departments in the world. Those of us who conducted research with Evans during this period were largely unaware of his efforts as department chair—he later attributed this to the fact that he allocated the period from 7:30 to 9 in the morning each day to his departmental duties, finishing before his colleagues had an opportunity to perturb the process. This was also the period that Evans established himself as a research leader par excellence heading major projects on ceramic matrix composites, toughening of ceramics, and thin films and multilayers. Evans made two more academic moves before completing a circle back to UCSB in 2002. From 1994 until 1998 Evans was the Gordon McKay Professor of Materials Engineering in the Division of Engineering and Applied Sciences at Harvard University and from 1998 to 2002 he served as the Gordon Wu Professor in the Department of Mechanical and Aerospace Engineering at Princeton University. The pull of Santa Barbara and UCSB remained strong, however, and he returned in 2002 to a joint appointment in the Departments of Materials and Mechanical Engineering where he focused primarily on teaching and research.

Any tribute to Tony Evans must begin with the impact of his work. Evans is the most highly cited materials scientist with almost 35000 citations to over 650 published journal papers. His h-index will soon pass 100. A short list of subjects to which Evans has made major contributions includes micro-cracking and transformation toughening of ceramics, ceramic matrix composites and metal matrix composites, thin film mechanics, interface mechanics, thermal barrier coatings, metallic foams, morphing structures, aerospace materials with special thermo-mechanical properties, lightweight lattice materials, and superior blast and ballistic resistant structural materials. On each of these problem areas, Evans brought to bear a fundamental understanding of material behavior at all scales together with innovative experiments in the laboratory. The experimental work he and his

collaborators performed more often than not focused on observation of micromechanical behavior and new phenomena rather than on refined measurement of material properties.

The synergy between Evans' grasp of theory and his insightful exploitation of experiment, combined with his love of subject and legendary ability to focus, would have been enough, by themselves, to establish his primacy. However, there is more. Evans' skills at assembling, inspiring and leading interdisciplinary teams of engineers and scientists to tackle challenging technological problems is the additional component of his approach which truly set him apart. Those who have had the experience of working with Tony Evans on one or more of the teams he put together will be aware that he had no match as a technology leader in the arena of structural materials. These include his former students, post-doctoral fellows, and a large cadre of colleagues which he brought together from many academic, government and industrial institutions, here and abroad. Particularly notable for each major project that Evans led were the workshops where ongoing work was reviewed and new work was planned with criticism and input from experts from industry and government labs. These workshops, which were always enlivened by Evans' active participation in every detail of the research, were exceptional in identifying the challenges and moving the research forward. Skepticism about the effectiveness of shifting research funding from smaller projects to relatively fewer large projects, a trend that has taken place over the past several decades in the US and is now spreading around the world, would be far less warranted if more large projects were led by individuals with the abilities of an Evans.

Tony Evans provided leadership in the materials community throughout his career in other ways as well. As already noted, he provided critical leadership in founding the Materials Department at UCSB for nearly six years and then later for the Princeton Materials Institute for four years, in each case without appearing to break step in his own research activities. Starting his service in 1974, Evans became the longest serving member of the Defense Sciences Research Council (formerly the Materials Research Council) of DARPA which played a major role in setting the agenda for research in advanced materials in the US. Simultaneous with all his other activities, during his entire career, Evans was a highly engaged consultant to many companies, not only in the materials industry but also in aerospace and electronics. To those of us who worked closely with Evans, it was clear that much of his research emphasis was motivated by problems that surfaced through his consulting activities. There is little wonder that his work has had, and will continue to have, such major impact.

In his testimony in celebration of Tony Evans' 65th birthday, Arthur Heuer noted that Evans' exceptional generosity to students and colleagues with his ideas and time was one of the keys to his success. Quoting Heuer directly: "It is his incredible ability to focus, his "nose" for important problems to work on, and his generosity in collaborative research, that have led to his revered status in our field." Throughout his career, Evans enjoyed working closely with his many students and post-docs who are now spread far and wide in academia, industry and government. These former junior colleagues, together with all his other collaborators, will keep Evans' legacy alive for years to come.

Tony Evans' contributions have been recognized in many ways—a few of them are listed below. He was a member of both the National Academy of Engineering and the National Academy of Sciences. He was also a Fellow of both the Royal Society (FRS) and the Royal Academy of Engineering in the UK. He was a Distinguished Life Member of the American Ceramics Society and received essentially every major award of this Society. He won the Henry Marion Howe Medal of ASM International, the Turnbull Award of the Materials Research Society, the Griffith Medal and Prize and Mellor Memorial Lectureship of the Institute of Materials, UK, and the Nadai Medal of ASME. He was an Alexander von Humboldt Senior Scientist. In 2008, Evans was especially pleased to receive the highest award granted by his alma mater, Fellow of Imperial

College, London.