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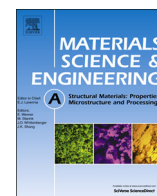


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Brief biography of Ali S. Argon: Winner of the 2015 MSEA Journal Prize

In 1969, I was a mechanical engineering senior in a Brazilian university (UFMG, in Belo Horizonte) and had the lowest academic rank, Monitor, given to me for having excelled in Physical Metallurgy. The office, which contained four desks, was Spartan and almost empty of books. I sat at a professor's desk, who never showed up and was at that time doing his doctorate in France. The three books in his shelf, I will never forget them because they became my companions during that year which was devoid of any activity other than an occasional repair of equipment. There was a book of poetry by Mayakovsky, extended typed and printed notes on thermodynamics, and a mysterious book with a yellow cover and a suggestive title: "Mechanical Behavior of Materials". The authors, McClintock and Argon, hailed from the hallowed MIT. As I leafed through the pages the complexity of the subject puzzled me, and was much beyond my knowledge of metals; there were ceramics, rubbers, and polymers. The treatment was challenging, and without a guiding hand I had difficulty working through the pages. I was preparing myself for graduate studies in the US and this book stimulated my curiosity and desire to understand the complexity of phenomena associated with the mechanical behavior of materials.

It was many years later, at the University of California, San Diego, that I had the venture to interact closely with the legendary Professor Argon. We had, at the time, an Institute for Mechanics and Materials, generously funded by the National Science Foundation for five years. Prof. Argon was on our Board of Governors and periodically came to California to guide us and help the institute in its important mission, to bring together two separate and disparaged communities, mechanicians and materials scholars. The success of this venture owes a great deal to Prof. Argon. He also took part as a lecturer in several summer schools and authored a splendid chapter on rate processes in crystalline and noncrystalline materials, for the ensuing book, appropriately titled *Mechanics and Materials: and Linkages* (J. Wiley, 1994).

The Institute of Mechanics and Materials sponsored a special lecture at TMS in honor of Egon Orowan and invited Ali Argon to deliver it. It was a momentous event and Fig. 1 shows the plaque being given to Prof. Argon by Dr. Paul Follansbee, while Fig. 2 shows his delivery. But Fig. 3, with his incisive mind, focused on some complex problem, captures best his unique intellect and attitude toward research. Since his stellar career will undoubtedly stimulate young scholars to pursue excellence in the field of Materials Science and Engineering, I am highlighting below his trajectory, which started in Turkey and reached its zenith at MIT.

Ali S. Argon was born in Istanbul, Turkey on December 19, 1930 to a father (M.A. Suphi Argon) descended from a family distinguished in Ottoman high ranking military and state service, and a mother (Margarethe, née Grosche) of Berlin, Germany. He was

educated in Turkey through high school. His higher education, beginning in 1948, was acquired entirely in the U.S.A., with a B.S. degree in 1952 from Purdue University and a S.M. degree in 1953 from the Massachusetts Institute of Technology (M.I.T.) – both in Mechanical Engineering. Through his association with Egon Orowan during his doctoral studies he gravitated to materials science, culminating with a Sc.D. degree from M.I.T. in 1956. For the next two years at the High Voltage Engineering Corporation of Burlington, MA, he worked on Van de Graaf particle accelerators for scientific research and medical applications. In 1958 he returned to Turkey for 18 months of military service in the Turkish Army Ordnance Corps. and discharged with a rank of 2nd Lieutenant. During part of that period, in 1959 he also held a subsidiary lectureship appointment in the Mechanical Engineering Department of the newly established Middle East Technical University in Ankara. He returned to the U.S. in 1960 to accept a faculty appointment in the Mechanical Engineering Department at M.I.T. where he rose in ranks from assistant professor to professor by 1968. In 1982 he was appointed to the newly established Quentin Berg Professorship in the Department, a position which he held until his *dejure* retirement from teaching duties in 2001. Presently he has the title of Quentin Berg Professor Emeritus and continues to engage in research and publishing.

Professor Argon has been married to Xenia (née Lacher) of New York City. They have a daughter, Alice, an astrophysicist, presently with the Harvard Smithsonian Astrophysical Observatory in Cambridge, MA; and a son, Kermit, an environmental biologist, engaged in the testing of food products for industry. Since 1960 the Argon's have been residents of Belmont, MA, but also spent much time in summer in their other residence in Wellfleet, MA, on Cape Cod.

Prof. Argon's direct professional research experience on the mechanisms of inelastic deformation and fracture has covered a full range of materials, including metals and alloys, ceramics, glasses, polymers and composites – both experimentally as well as through mechanistic computer simulations. His research results have been published in premiere technical journals, in conference proceedings and in books. These publications are in excess of 380 (2013), and include several books authored or edited by him. He is one of the most widely cited authors in materials science in the world. Argon has been, and still is one of the most sought-after keynote lecturers in national and international conferences. Some of these include a University of London Lecture (1979), the K.C.B. McDonald Lecture of the Canadian Metal Physics Society (1985). The Midwest (1985) and the Southwest (2000) Mechanics Lecture Series, the TSM/IMM Lecture (1998) as well as numerous lectures in Gordon Conferences in a variety of areas.

Ali Argon was a visiting professor of polymer physics at the



Fig. 1. Professor Argon receiving commemorative plaque from Dr. Paul Follansbee, at TMS Distinguished Orowan lecture on Mechanics and Materials.

University of Leeds in the U.K. (1972), a visiting scientist at the Institute for Metal Physics of the University of Göttingen with an Alexander von Humboldt Society Award (1992) and also a visiting scientist at the Department of Materials Science and Engineering at Stanford University (1992).

He has been a member of review committees of National Laboratories and University Centers, of a number of technical committees of the National Science Foundation (NSF), National Research Council (NRC), National Materials Advisory Board (NMAB) and the National Academy of Sciences/National Academy of Engineering (NAS/NAE), and acted as chairman of several of these. He has been on the Board of Directors of the Society of Engineering

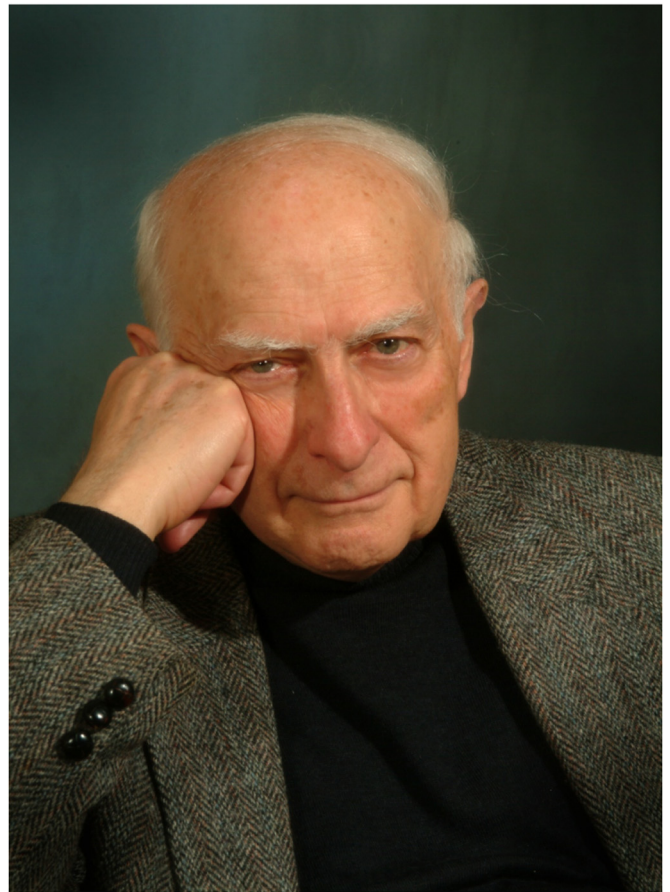


Fig. 3. Portrait of Professor Argon.

Science (SES) and the Board of Governors of the Institute for Mechanics and Materials (IMM). He is a member of the American Physical Society (APS), The Materials Society (TMS), the American Society for Metals (ASM), the American Society of Mechanical Engineers (ASME), the Materials Research Society (MRS) and the Society for Engineering Science (SES).

His research has been recognized by a number of honors and awards, which include the Charles Russ Richards Award of the



Fig. 2. Professor Argon delivering Orowan lecture at TMS.

American Society of Mechanical Engineering (ASME) (1976); the Nadai Medal of the ASME (1998); the Staudinger Durrer Medal of the ETH of Zurich, Switzerland (1999); Fellowship in the American Physical Society (1987); Honorary Fellowship of the International Conferences of Fracture (1983); Distinguished Life Membership in the Sigma Alpha Mu (International Professional Society of Materials and Engineering) (2000); The Heyn Medal of the German Materials Society (Deutsche Gesellschaft für Materialkunde) (2004). He was the recipient of a U.S. Senior Scientist Award of the Alexander von Humboldt Society of Germany (1992) for research in Germany. He is a member of the U. S. National Academy of Engineering (NAE) (1989). He was awarded an honorary doctorate of engineering (D-Eng) by Purdue University (2005).

In the time-honored German tradition of claiming scientific ancestry (Stammbaum) he considers the German theoretical physicist Richard Becker as his scientific grandfather, through his association with Egon Orowan, his doctoral advisor, who was in turn, the latter's graduate student; and considers the French chemist and twice Nobel Laureate, Madame Marie Curie as his scientific grandmother through his association with Robert J. Van de Graaf of the High Voltage Engineering Corporation who was a student of the latter.

Professor Argon made, following his advisor's trajectory, seminal contributions to our understanding of deformation and fracture of engineering materials through the application of mechanics to microstructure. In this domain, his proposal of shear transformations (ST) into materials as mechanisms of incremental local shear relaxations is of primary import, mainly for non-crystalline materials.

In addition to the classic McClintock and Argon book referred to above, Prof. Argon recently published two books in which he summarizes and crystallizes his opus:

Strengthening Mechanisms In Crystal Plasticity (Oxford U. Press, 2007).

The Physics of Deformation and Fracture of Polymers (Cambridge U. Press, 2013).

Additionally, he co-authored many seminal papers that have significantly enhanced our understanding of the mechanics of crystalline and glassy materials. The first work below was his doctoral thesis:

Ali Suphi Argon, Investigations of The Strength and Anelasticity of Glass, Massachusetts Institute Of Technology, Sc. D. Thesis, 1956.

His ten most highly cited articles are listed below and provide a measure of the breadth as well as depth of his work.

Argon, A.S., Plastic-Deformation In Metallic Glasses, *Acta Metallurgica*, Volume: 27 Issue: 1 Pages: 47–58, 1979

Kocks, U.F., Argon, A.S., Ashby, M.F., Thermodynamics And Kinetics of Slip, *Progress In Materials Science*, Volume: 19 Pages: 1–281, 1975

Boyce, M.C., Parks, D.M., Argon, A.S., Large Inelastic Deformation of Glassy-Polymers. 1. Rate Dependent Constitutive Model, *Mechanics of Materials*, Volume: 7, Issue: 1, Pages: 15–33 Sep 1988

Argon, A. S., Im, J., Safoglu, R., Cavity Formation From Inclusions in Ductile Fracture *Metallurgical Transactions*, Volume: A 6, Issue: 4, Pages: 825–837, 1975

Argon, A.S., Theory For Low-Temperature Plastic-Deformation of Glassy Polymers *Philosophical Magazine*, Volume: 28, Issue: 4, Pages: 839–865, 1973

Pollock, T.M., Argon, A.S., Creep Resistance of CMSX-3 Nickel-Base Superalloy Single-Crystals, *Acta Metallurgica Et Materialia*, Volume: 40, Issue: 1, Pages: 1–30, Jan 1992

Kim, J.J., Choi, Y., Suresh, S., et al., Nanocrystallization During Nanoindentation of A Bulk Amorphous Metal Alloy At Room Temperature, *Science*, Volume: 295, Issue: 5555, Pages: 654–657, Jan 25 2002

Takeuchi, S., Argon, A.S., Steady-State Creep of Single-Phase Crystalline Matter At High-Temperature, *Journal Of Materials Science*, Volume: 11, Issue: 8, Pages: 1542–1566, 1976

Lin, L., Argon, A.S., Structure And Plastic-Deformation of Polyethylene, *Journal of Materials Science*, Volume: 29, Issue: 2, Pages: 294–323, Jan 15 1994

Bartczak, Z., Argon, A.S., Cohen, R.E., et al., Toughness Mechanism In Semi-Crystalline Polymer Blends: I. High-Density, Polyethylene Toughened With Calcium Carbonate Filler Particles, *Polymer*, Volume: 40, Issue: 9, Pages: 2347–2365, Apr 1999

Throughout his career, Professor Argon contributed periodically to the excellence of *Materials Science and Engineering A* and has approximately twenty papers published in this venue. *Materials Science and Engineering A* continues to be one of the leading materials journals globally and this fitting tribute to a pioneer in the field is a testament to the continuing search for excellence that he exemplifies.

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