

Merton C. Flemings
Professor and Faculty Director, Lemelson-MIT Program

An inventor and specialist in metallurgy and materials science, Professor Merton C. Flemings has focused his career on how to produce better products through understanding and applying the underlying science of materials.

Flemings developed an interest in metallurgy as a sophomore at MIT. According to Flemings, “It looked like a great hands-on field with a lot of chemistry and physics involved.” He received his S.B. degree from MIT in the Department of Metallurgy in 1951, followed by his S.M. and Sc.D. degrees in metallurgy in 1952 and 1954, respectively.

From 1954 to 1956, Flemings was employed as a metallurgist at Abex Corporation in Mahwah, New Jersey, and in 1956 he returned to MIT as assistant professor. He was appointed associate professor in 1961, professor in 1969, Abex Professor of Metallurgy in 1971, Ford Professor of Engineering in 1975, Toyota Professor of Materials Processing in 1981, and Professor, and Toyota Professor of Materials Processing Emeritus, in 2002.

Flemings established the Materials Processing Center at MIT in 1979; he was the director from 1979 to 1982. He served as head of the Department of Materials Science and Engineering from 1982 to 1995 and thereafter returned to serve as a full-time teacher and researcher as Toyota Professor. Flemings was a visiting professor at Cambridge University in 1971, Tokyo University in 1986, and Ecole des Mines de Paris in 1996. From 1999 to 2001 he served as co-director of the Singapore-MIT Alliance, a major distance educational and research collaboration between MIT and two Singaporean universities. He was also chairman of the board of the Silk Road Project, Inc. from 1996 to 2006, a non-profit foundation established to broadly illuminate contributions of the Silk Road to the arts and society and support innovative collaborations among artists of the Silk Road and the west. He is currently faculty director of the Lemelson-MIT Program, which recognizes inventors, encourages sustainable development for real-world problems, and inspires youth to pursue creative lives and careers.

Flemings' research and teaching concentrate on engineering fundamentals of materials processing and innovation of materials processing operations. His first patent was issued in 1965 for “Casting Process and Apparatus for Obtaining Unidirectional Solidification.” Two of his most notable inventions are processes widely used in industry. One is the process to use magnetic fields to improve the quality of silicon single crystals and of steel continuous castings. The other process produces and forms metals in the semi-solid state; it is used to produce high-quality lightweight aluminum components for cars. He has worked closely with industry to solve problems, and he currently serves on a number of corporate and technical advisory boards.

Flemings has been active internationally in strengthening the field of materials science and engineering and delineating new directions for it. He is author or co-author of 335 papers and two books in the fields of solidification science and engineering, foundry technology, and materials processing. He has received numerous medals, awards and distinctions and is a member of the National Academy of Engineering and the American Academy of Arts and Sciences. In 2002, two endowed chairs were established in his name at MIT.

Today, Flemings continues to invent—he currently holds 31 co-authored patents. Flemings advises aspiring inventors to “keep focused, work hard, don’t get discouraged, and have fun.”