



The **Kroll**

ZIRCONIUM MEDAL

Award

JUNE 2022

Ottawa
Canada

Previous Recipients

- 1975 — **Admiral H.G. Rickover**, U.S. Navy, USA
- 1976 — **Dr. Brian Cox**, Atomic Energy of Canada Ltd. (AECL), Canada
- 1978 — **Dr. Benjamin Lustman**, Bettis Atomic Power Laboratory, USA
- 1980 — **W.W. Stephens**, U.S. Bureau of Mines, USA
- 1982 — **Stephen W.H. Yih**, Wah Chang, USA
- 1983 — **Dr. M.L. Picklesimer**, USNRC (Retired), USA
- 1984 — **Dr. F.A. Nichols**, Argonne National Laboratory, USA
- 1985 — **R.P. Syre**, CEZUS, France (Retired)
- 1986 — **MISHIMA**, Yoshitsugu, Japan (Retired)
- 1987 — **J.M. Googin**, Martin Marietta Energy Systems, Inc., USA
- 1988 — **P. Besson, J. Guerin, and P. Brun**, CEZUS France
- 1989 — **Dr. V. Fidleris**, AECL, Canada
- 1990 — **Dr. Antonina V. Nikulina**, All-Union Scientific and Research Institute, Russia
- 1991 — **Dr. J.S. Armijo, Dr. Louis F. Coffin, Jr., and Dr. Herman S. Rosenbaum**, General Electric, USA
- 1992 — **David O. Pickman**, UKAEA (Retired), UK
- 1993 — **J.A.L. (Archie) Robertson**, AECL (Retired), Canada
- 1994 — **Frederich Garzarolli, Dr. Heinz Stehle** (Retired), and **Eckard Steinberg**, Siemens AG, KWU, Germany
- 1995 — **Dr. Ronald B. Adamson**, GE Nuclear Energy, USA
- 1996 — **Dr. Charles Ells and Dr. Anthony Sawatzky**, AECL, Canada
- 1997 — **Dr. Daniel Charquet**, CEZUS, France
- 1998 — **Dr. C.E. Coleman**, AECL, Canada
- 1999 — **Dr. Clément Lemaignan**, CEA, France
- 2000 — **John Schemel**, Sandvik Special Metals (Retired), USA
- 2001 — **Dr. George Sabol**, Westinghouse (Retired), USA
- 2002 — **Dr. Erich Tenckhoff**, Siemens (Retired), Germany
- 2003 — **Dr. Kjell Pettersson**, Studsvik Energiteknik, Sweden
- 2004 — **Prof. Richard Holt**, Queen's University, Canada
- 2005 — **Dr. Malcolm Griffiths**, AECL, Canada
- 2006 — **B.J. Sanders**, Sterling Chemicals (Retired), USA
- 2007 — **Mr. John G. Banker**, Dynamic Materials Corporation, USA
- 2008 — **Dr. David Franklin**, EPRI, Bettis Atomic Power Laboratory and DOE, USA
- 2009 — **Dr. Viatcheslav N. Shishov**, Bochvar Institute (VNIINM), Russia
- 2010 — **Dr. Brian A. Cheadle**, AECL (Retired), Canada
- 2011 — **Mr. John J. Kearns**, Bettis Atomic Power Laboratory, USA
- 2012 — **Dr. Srikumar Banerjee**, Bhabha Atomic Research Centre, India
- 2013 — **Dr. R.A. Murgatroyd**, UKAEA (Retired), and **Dr. A. Rogerson**, AMEC Foster Wheeler (Retired), UK
- 2014 — **Prof. A.T. Motta**, Pennsylvania State University, USA
- 2015 — **Dr. T. Fuketa**, Nuclear Regulatory Authority, Japan
- 2016 — **Mr. Peter Rudling**, ANT International, Sweden
- 2017 — **Mr. Bruce Kammenzind**, NNL Bettis Laboratory, USA
- 2018 — **Prof. Michael Preuss**, University of Manchester, UK

The **Kroll** **ZIRCONIUM MEDAL** **Award**

THE WILLIAM J. KROLL ZIRCONIUM MEDAL has been established to recognize outstanding achievement in the scientific, technological or commercial aspects of zirconium production and utilization, and to encourage future efforts, studies and research. Once regarded as a rare metallurgical curiosity, this exotic metal has been proven to possess exceptional properties which made it suitable for use in nuclear reactors and to possess exceptional resistance to corrosion in most media.

The naming of the medal for Dr. W.J. Kroll is most appropriate in that he and his colleagues in the U.S. Bureau of Mines developed the process that could be carried out on a commercial scale so that the one-time laboratory curiosity could become an article of commerce.

The concept of the medal was initiated by Wah Chang, a company which produced unusual metals, including zirconium, by the Kroll Process. The recipients of the medal are selected by a standing international committee charged with recognizing historically unique and significant contributions to zirconium alloy production and technology. The administration of the award had been a function of the W.J. Kroll Institute for Extractive Metallurgy of the Colorado School of Mines which was established by gifts from the late Dr. Kroll. In 1982, the ASTM B10 committee on reactive and refractory metals became co-sponsors of the medal award. In 2003, the Kroll Institute could no longer provide support for this award and the ASTM International B10 committee assumed full responsibility for its funding and administration.



Recipients

2019 — Dr. Anand M. Garde

Dr. Anand M. Garde received his BTech in metallurgical engineering from the Indian Institute of Technology, Bombay in 1967 and his MS in the same subject from Syracuse University in 1970. He subsequently completed his PhD in materials science at the University of Florida in 1973 investigating deformation of zirconium. Throughout his career, he worked on different zirconium topics related to unirradiated and irradiated materials: ANL (1974-79), Combustion Engineering (1979-1990), ABB (1990-2000), and Westinghouse (2000-2016). He worked on manufacturing of PWR and BWR fuel, evaluations of corrosion resistance and embrittlements due to oxygen, hydrogen, and irradiation. He contributed to the resolution of significant fuel performance issues. He developed several advanced alloys with superior in-reactor performance. He organized ASTM International Zirconium Symposia in 9 countries around the world. In 2016, he retired from Westinghouse Electric Company as Engineer Emeritus and started a nuclear zirconium materials consulting company ZiraShri.

2020 — Dr. Bo-Ching Cheng

Dr. Bo-Ching Cheng received his PhD in materials science and engineering from the University of Illinois. He spent 17 years in research and development of BWR nuclear fuel at GE Nuclear Energy and became a technical leader responsible for nuclear fuel materials, specifically Zr-based alloy development, and in-reactor performance. His notable research focused on understanding and mitigation of nodular corrosion and PCI (pellet-clad interaction). In 1992, he joined EPRI's nuclear fuel program where he led several fuel corrosion failure root cause investigations and projects for major water chemistry transitions such as hydrogen water chemistry (HWC) and noble metal chemical addition (NMCA) in BWRs. Dr. Cheng and his co-workers have published several influential technical papers providing some unique and important insights into zirconium alloy cladding development and addressing significant in-reactor corrosion issues experienced in commercial power plants.

2021 — Mr. Richard Sutherlin

Richard Sutherlin graduated as a metallurgical engineer in 1977 from the Montana School of Mines. He received a "Distinguished Alumni Recognition Award" from the University of Montana in 1995 for his professional accomplishments and became a professional engineer (Oregon) in metallurgical engineering in 2000. During his 39-year career at ATI Wah Chang (currently ATI Specialty Alloys & Components), Richard Sutherlin has been responsible for building and growing the industrial application of zirconium as a material of choice for corrosion resistance. During his career, Rick has developed and patented technology and products to support the use of Zr-alloys by the nuclear and chemical industries and he has championed the development of international standards to assure the consistency and reliability of zirconium. Since retiring from his position as Manager of Technical Services, Rick continues to be active on the ASME Boiler and Pressure Vessel code, the American Welding Society, and the National Association of Corrosion Engineers. He has recently written a 100+ page book for the Materials Technology Institute on "Zirconium for Chemical Process Applications" and continues to consult on technical issues related to the use of Zr-alloys.

Wednesday, June 22, 2022

OTTOWA, CANADA

MASTER OF CEREMONY —

Dr. Malcolm Griffiths, Queen's University, Canada

WELCOME AND INTRODUCTION ON BEHALF OF ASTM INTERNATIONAL —

Dr. Anand M. Garde, Chair, Kroll Award Selection Committee and B10 Symposium Sub-committee, ZiraShri LLC, USA

PRESENTATION OF THE WILLIAM J. KROLL ZIRCONIUM MEDALS AND CITATIONS —

Dr. Malcolm Griffiths and **Dr. Anand M. Garde**

HISTORICAL ACCOUNTS BY THE MEDAL RECIPIENTS —

Dr. Anand M. Garde

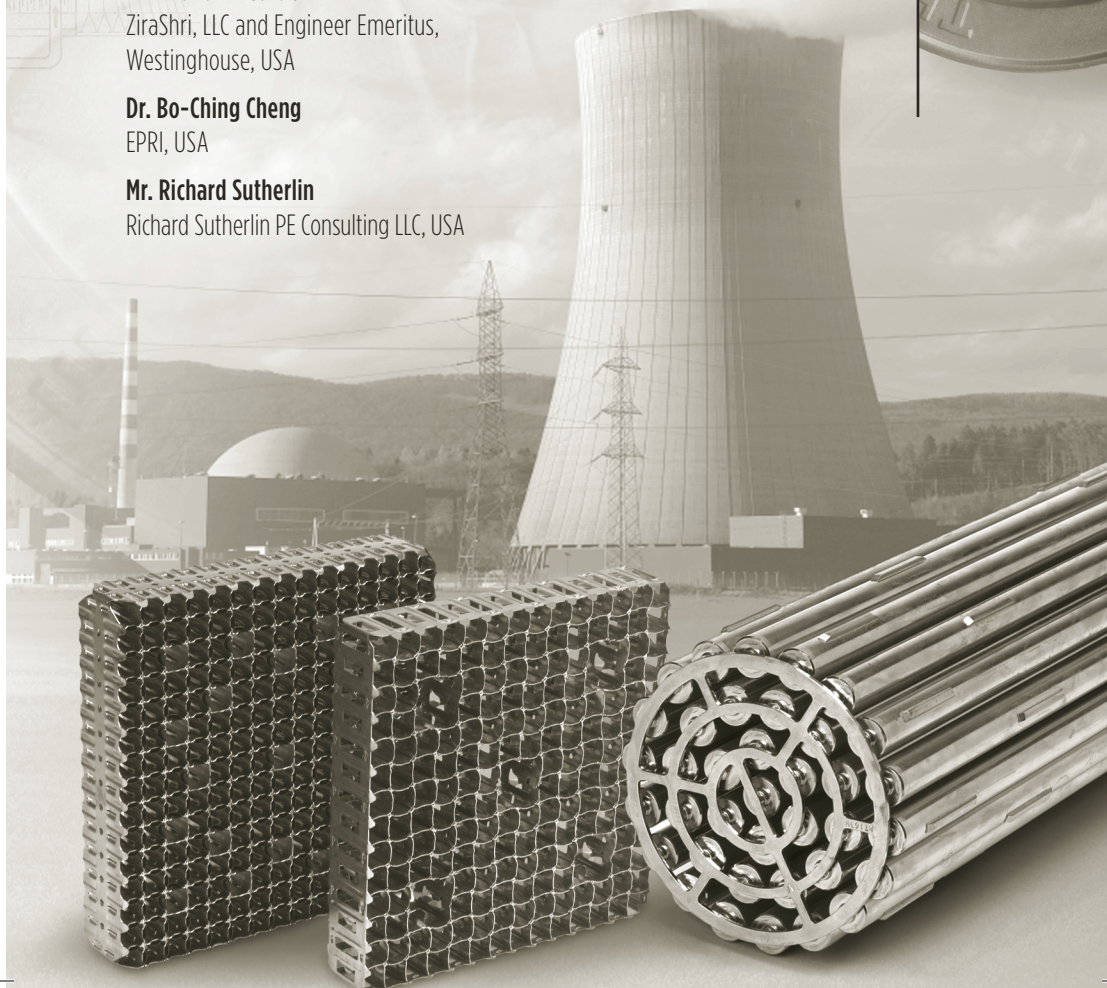
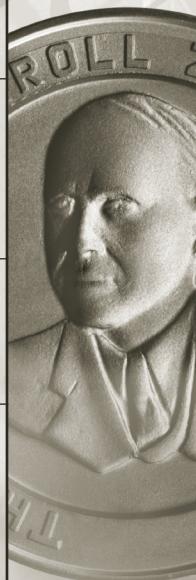
ZiraShri, LLC and Engineer Emeritus,
Westinghouse, USA

Dr. Bo-Ching Cheng

EPRI, USA

Mr. Richard Sutherlin

Richard Sutherlin PE Consulting LLC, USA



Award Selection Committee

Mr. John Banker

Clad Metal Consulting
Lyons, Colorado, USA

Dr. Pierre Barberis

Framatome
Ugine, France

Dr. Edward Darby

Rolls-Royce
Derby, UK

Dr. Anand M. Garde, Chairman

ZiraShri LLC
Engineer Emeritus, Westinghouse
Columbia, South Carolina, USA

Mr. Brett Herb

ATI Specialty Alloys & Components
Albany, Oregon, USA

Prof. Malcolm Griffiths

Queen's University
Kingston, Ontario, Canada

Dr. Valadamir Markelov

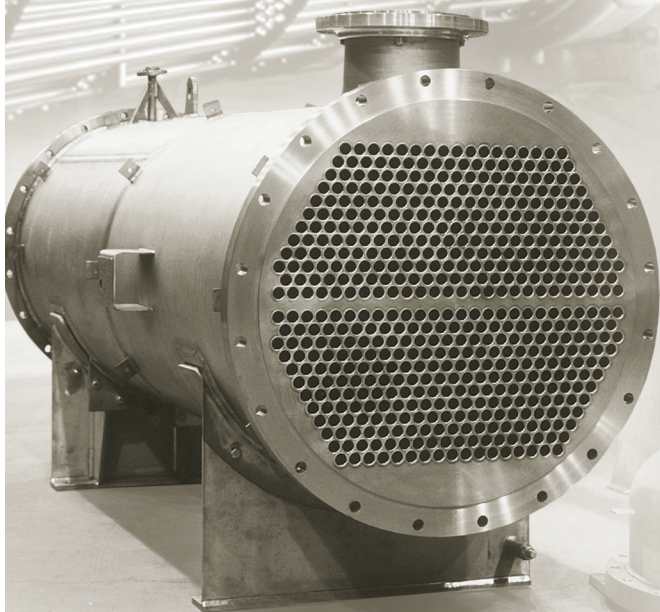
Bochvar VNIINM
Moscow, Russia

Mr. David Schrire

Vattenfall Nuclear Fuel
Stockholm, Sweden

Dr. Sheikh T. Mahmood

Consultant, ANT International
Pleasanton, California, USA



Profile

DR. WILLIAM JUSTIN KROLL was one of the foremost metallurgists of our times. He was a devoted experimentalist with a remarkable ability to ascertain the scientific and industrial significance of results obtained in the laboratory. As a young man, Dr. Kroll was recognized for discovering a process to remove bismuth from lead. Later he devised the first commercial process to produce titanium — the Kroll process. His last large-scale endeavor was a procedure to produce ductile zirconium; the resulting metal was used in building the reactor for the first nuclear submarine.

Born in Luxembourg, Dr. Kroll received his university training in Germany. He worked for the Metallgesellschaft until he established his own research laboratory in Luxembourg. He turned out an astonishing series of metallurgical developments on such diverse subjects as beryllium production, age-hardenable alloys, vacuum metallurgy, and especially the production of zirconium by the reduction of chloride with magnesium.

With the start of World War II, he moved to the United States, working for four years with Union Carbide in Niagara Falls and then transferring to Oregon as consultant to the U.S. Bureau of Mines. He lived for many years in Corvallis, Oregon, before returning to Europe, where he built a house in a suburb of Brussels to be near his brother, Theodore.

W.J. Kroll died in March 1973 — he was never married, but he left a host of friends and admirers.



William



The Kroll Medal Selection Committee and ASTM International gratefully acknowledge ATI for fabrication of the Kroll Medals and Smith & Nephew for engraving them.

