



The **Kroll**

ZIRCONIUM MEDAL

Award

MAY 2019

Manchester
UK

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**, Queens 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

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

Wednesday, May 22, 2019

MANCHESTER, UK

2016 — Mr. Peter Rudling

Peter Rudling attained a Master's Degree in Metallurgy and Materials Technology from the Royal Institute of Technology, Stockholm, in 1981. He then worked for Westinghouse Sweden (formerly ABB Atom), EPRI, and Vattenfall Fuel, and published several significant papers on zirconium alloy corrosion and microstructure.

In 2000, with the creation of Advanced Nuclear Technology International (ANTI), Peter assumed responsibility for the ZIRAT (ZIRconium Alloy Technology) program started by Alfred Strasser in 1996. The aim of ZIRAT is to enable nuclear utilities and laboratories to gain understanding of material behaviour to ensure successful core operation and to evaluate performance at the end of fuel cycles. This objective is met through annual seminars and comprehensive reports by acknowledged experts who review recent and historical data on the scientific, technological, and commercial aspects of zirconium production and in-reactor performance of core components. Today, through Peter Rudling's leadership, the ZIRAT program has expanded and has been delivered to 74 organizations in 21 countries across Europe, the Americas, and South-East Asia.

2017 — Mr. Bruce Kammenzind

Bruce Kammenzind studied nuclear engineering at the University of Illinois, USA before joining the Bettis Laboratory in 1980. He later gained master's degrees in mechanical engineering and materials science. In various technical and managerial roles at Bettis, the main focus of his work has been the performance of reactor core fuel, cladding, and structural materials. Bruce's technical expertise and leadership have been influential in the interpretation and dissemination of key data, knowledge, and mechanistic understanding of the in-reactor performance and structural integrity of zirconium alloy fuel cladding and core structural materials. He and his co-workers have provided some unique and fundamental insights into zirconium alloy behaviour, including several important observations on the long term in-reactor corrosion, hydriding, and migration of hydrogen in Zircaloy-4.

Bruce Kammenzind is currently a Consultant Engineer, Core Structural Materials Technology at NNL Bettis Laboratory, West Mifflin, Pennsylvania, USA.

2018 — Professor Michael Preuss

Michael Preuss obtained his PhD from the Technical University Hamburg-Harburg, Germany and joined the University of Manchester, UK in 1999. Since 2003, he has established and developed a research group on zirconium alloys for nuclear applications. Michael has played a leading role in promoting research programme collaborations between nuclear industry and universities such as MUZIC and MIDAS. A key feature of Michael's research is the development of a physically-based understanding of microstructure development during processing and the mechanisms that determine zirconium alloy performance, using state-of-the-art analytical tools such as: micro-analytical characterization of irradiation-induced nano-precipitation and dislocation loop development, variant selection in dual-phase zirconium alloys using EBSD microtexture analysis, and synchrotron diffraction and phase mapping of oxides formed under irradiation via crystal orientation mapping in TEM.

MASTER OF CEREMONY —

Dr. Edward Darby, Rolls-Royce, UK

WELCOME AND INTRODUCTION ON BEHALF OF ASTM INTERNATIONAL —

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

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

Dr. Edward Darby and **Dr. Anand Garde**

HISTORICAL ACCOUNTS BY THE MEDAL RECIPIENTS —

Mr. Peter Rudling

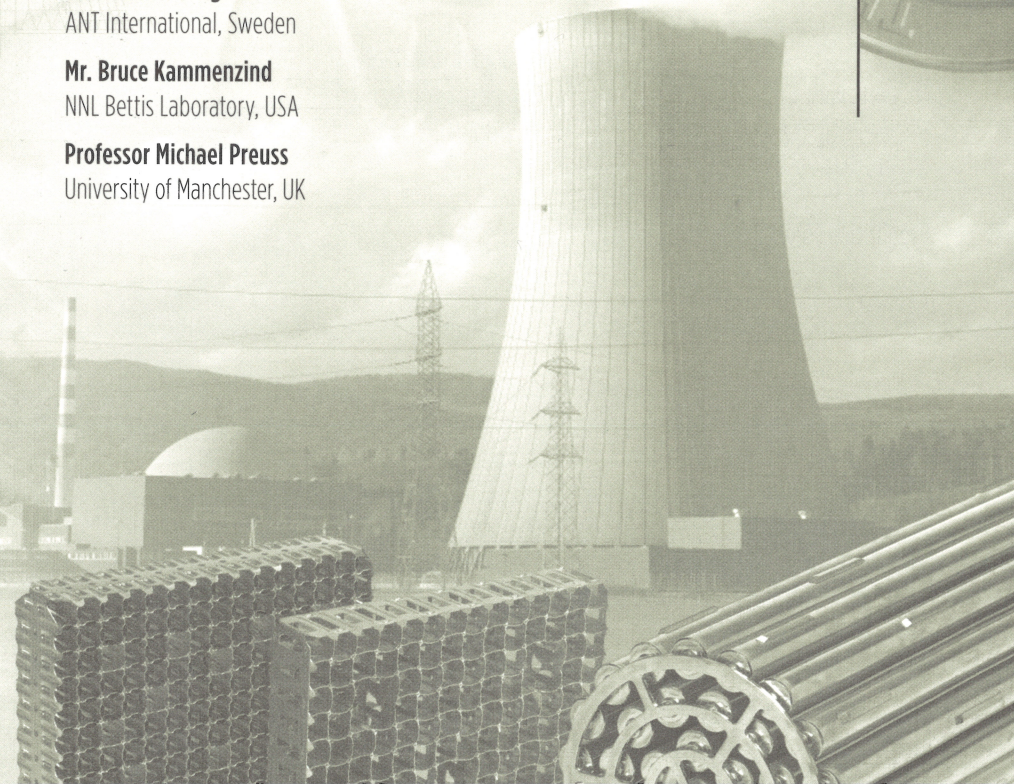
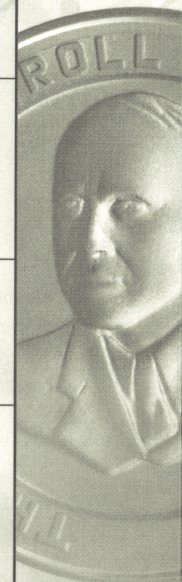
ANT International, Sweden

Mr. Bruce Kammenzind

NNL Bettis Laboratory, USA

Professor Michael Preuss

University of Manchester, UK



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
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Vattenfall Nuclear Fuel
Stockholm, Sweden

Dr. Sheikh T. Mahmood

Consultant, ANT International
Pleasanton, California, USA

Profile

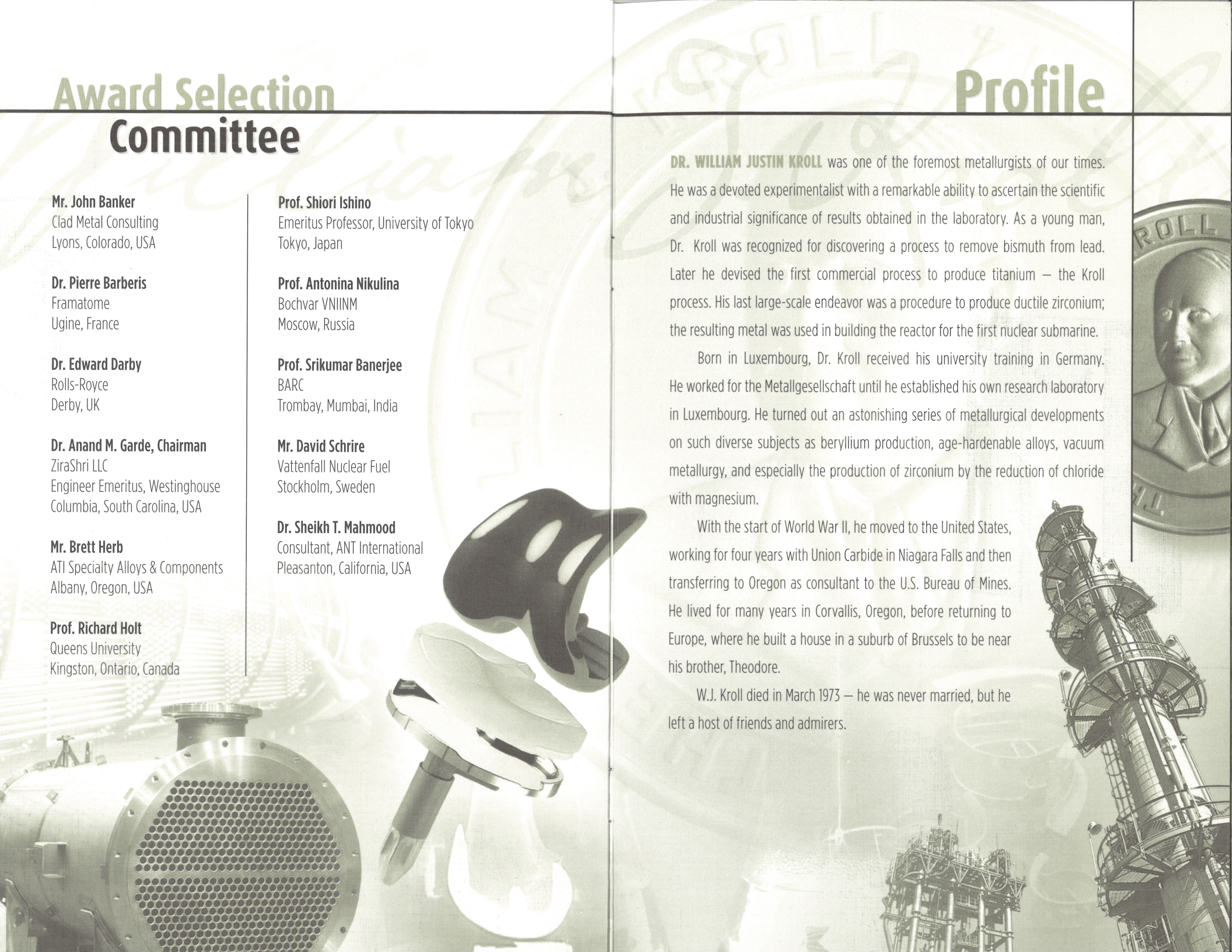
DR. WILLIAM JUSTIN KROLL was one of the foremost metallurgists of our times.

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.

