2017 Acta Materialia Hollomon Award for Materials & Society

Dr. Warren Poole, Professor and Department Head, and Rio Tinto Aluminium Chair in Materials Process Engineering at the University of British Columbia in Canada is the recipient of the 2017 Acta Materialia Hollomon Award for Materials & Society. Dr. Poole's research into the properties of lightweight metals has led him to create safe, mass-producible alloy automobile parts that could reduce fuel use and greenhouse gases emitted by vehicles in Canada by 40 percent by 2025. He holds a leading position in the field of Integrated Computational Materials Engineering (ICME), is a member of multiple international conference committees and advisory boards, has facilitated industry-academy partnerships in North America, the United Kingdom and Europe, and continues to teach, advise, and develop curricula for both undergraduates and graduate students.

Dr. Poole and his team have created breakthrough automotive lightweighting opportunities by developing a process to warm form complex vehicle components from the magnesium ZEK100 alloy. Since 1995, he has been one of lightweighting's most avid proponents around the world. He has presented at close to 60 conferences, won 15 awards including the 2013 Canadian Materials Physics Award and best paper published by the Japan Institute of Metals and Materials publication *Materials Transactions* in 2014, and been instrumental in research endeavours with a total funding of close to $27 million.

Twenty-five percent of the world's greenhouse gas (GHG) emissions derive from automobiles, and they are the world's sixth-leading cause of death. Public transit, car sharing, and alternative fuels are only part of the GHG and safety solutions. Their necessary counterpart is the reduction of overall vehicle weight. Every 10 percent weight reduction yields a six-to-eight percent increase in fuel economy. Because magnesium is 80 percent less dense than traditional steel, breakthroughs in both materials and methods of manufacture could reduce a vehicle's weight by up to 60 percent, making traditional petroleum-burning vehicles vastly more efficient and rendering alternative fuels more effective and commercially viable.

Born in 1964 in London, Ontario, Canada, Warren James Poole spent his teenage years obsessed with cars. But he never imagined they would figure in his career. He earned his BSc from the University of Western Ontario (1987), worked as a research engineer at Dofasco Inc. for two years and then obtained his PhD from McMaster University (1993); both degrees were in Materials Engineering. In 1995, just a year into Dr. Poole's Assistant Professorship with UBC Applied Science, Alcan International invited him to work on the development of "6000" series aluminum alloys for automotive applications. The venture was an early signal of his success in strengthening partnership and

knowledge-sharing between the academy and industry. Whether by transferring process model software to relevant companies or collaborating with automotive R&D specialists across North America, Dr. Poole has made it a priority to strengthen the academy-industry relationship and to ensure that the benefits of his team's work reach the public.

Since then, Dr. Poole has focused on the primary metals of automotive construction—steel, aluminum, and magnesium—with the aim of increasing our understanding of the microstructural properties of metal alloys in response to thermal processing, including precipitation hardening, plasticity and deformation, heterogeneous microstructures, and the microstructures of advanced steels in automobiles. His research involved experiments at the Los Alamos Neutron Scattering Center and Canadian Centre for Neutron Scattering in Chalk River, and earned him a Killam Research Fellowship in 2005.

In 2006, Dr. Poole turned his attention to magnesium, the lowest-density structural metal and yet the least understood. General Motors approached him, keen to know magnesium's viability for automotive construction. Concurrently, the Natural Sciences and Engineering Research Council of Canada (NSERC) was reinvigorating its strategic research program. Under the name MagNET—Magnesium Research Network—Dr. Poole's international team garnered over $6 million in funding as well as the support of GM and Magna International (one of North America's largest supplier of parts and components to the automotive sector). Between 2009 and 2014, six industrial partners and 18 researchers at five universities worked under Dr. Poole's leadership to define the material properties of magnesium from the atomic level to the fabrication of a full-scale door inner to determine the viability of lightweight magnesium and Mg-alloy replacements for steel in personal automobiles.

In the face of considerable professional skepticism—he was told it could not be done—Dr. Poole and his team produced a door inner from a magnesium alloy sheet in under 10 seconds at temperatures below 250 ^{o}C, using a process that was reproducible and commercially viable. In 2013, MagNET and its industry partners announced the production of the commercial prototype door inner using a warm forming technology. The project earned the 2014 International Magnesium Association's Award of Excellence (Process Division). Now, Dr. Poole's vision for a "digital factory" could raise the quality and safety of these materials, increase productivity, and reduce costs—this field's greatest challenges—so that large-scale production is efficient and the end product affordable.

Over the past 20 years, Dr. Poole has inspired over 750 undergraduate and more than 35 graduate students to work on problems that matter to the world. They are now researchers with ArcelorMittal, Novelis, and Tesla; agents for the Department of National Defense and Natural Resources Canada; and academics at École des Mines, Paris, the University of Grenoble, and the University of Waterloo. He continues to teach and to create new courses for the greatest knowledge mobilization force of all: his students.

The Acta Materialia, Inc. Hollomon Award in Materials & Society was established in memory of Dr. J. Herbert Hollomon and his dedication to promoting positive social

consequences of science and technology that have had a major impact on society. The Award consists of a glass sculpture, an inscribed certificate and a cash honorarium.

Dr. Poole was selected as the 2017 awardee by an international panel of judges appointed by the Board of Governors of Acta Materialia, Inc. and will receive the prestigious award in March 2017 during the TMS Annual Meeting in San Diego, CA.