



Technological advances in resource recovery and recycling for materials sustainability

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Abstract

Metals and materials production from primary sources, such as ore, are highly energy intensive, expensive and environmentally unfriendly. Materials are non-renewable and, therefore, their supply is limited. Post-consumer as well as manufacturing wastes are valuable secondary resources. Most structural and functional materials used today, can be reprocessed and put back into service at a much lower cost and energy consumption through conscious recycling and recovery programs. Most production wastes, such as mineral processing tailings, mechanical processing swarfs and solid pyrometallurgical processing effluents, as well as, post-consumer wastes from the aerospace, automotive, energy-storage and electronic industries, present tremendous opportunities to improve resource productivity. In order to ensure secure materials supply and attenuate supply-demand imbalance, it is of utmost importance to look at opportunities to recycle and reuse from secondary sources. This presentation will describe the technological developments made to convert these valuable resources into functional manufactured materials for industrial applications.

Biography:

Brajendra Mishra is the Kenneth G. Merriam Distinguished Professor of Mechanical Engineering and Director of the Metal Processing Institute at the Worcester Polytechnic Institute [WPI]. Dr. Mishra is the Director of the National Science Foundation's Industry/University Collaborative Research Center on Resource Recovery & Recycling. Brajendra received his Bachelor of Technology degree in Metallurgical Engineering from the Indian Institute of Technology in Kharagpur, India and his M.S. and Ph.D. in Materials Science from the University of Minnesota in Minneapolis. Prior to joining WPI, Prof. Mishra was a Professor of Corrosion and Physico-chemical Processing in Metallurgical & Materials Engineering at the Colorado School of Mines [CSM] where he now serves as a University Emeritus Professor. Dr. Mishra has over thirty years of research experience in materials recovery and recycling, molten salt pyrometallurgy and electrochemistry and has many contributions to the application of these technologies to materials development and processing. Dr. Mishra has authored over 500 technical publications in refereed journals and conference proceedings. He holds thirteen patents and has authored/edited 20 books. Dr. Mishra is a member of TMS, ASM International, and NACE. He is a Fellow of ASM (2001) and TMS (2016). Mishra received the Distinguished Service Award from the Minerals Metals & Materials Society (2010) and the highest award of Honorary Membership from the Indian Institute of Metals (2008). Brajendra served as the 2006 President of The Mineral, Metals & Materials Society (TMS) of AIME and the 2011 President of Amer. Institute of Mining, Metallurgical & Petroleum Engineers. Dr. Mishra received the Presidential Citation of AIME in 2015 and the Kenneth Andrew Roe Award from AAES (2016).