Dr. Toni Marechaux, FASM
Trustee (2019-2023)

Dr. Toni Marechaux, FASM
Lead Analyst
Booz Allen Hamilton
Washington, DC

Dr. Toni Marechaux currently serves as a lead analyst at the Advanced Research Projects Agency for Energy (ARPA-E) in the US Department of Energy. Previously, she served as a senior analyst for the Defense Science Board and a science advisor to ZIN Technologies in support of space experiment design. Dr. Marechaux also spent five years at the National Academies of Sciences, Engineering, and Medicine. During her tenure there, she directed more than 30 studies for the National Materials Advisory Board and the Board on Manufacturing and Engineering Design.

Prior to the National Academies, Dr. Marechaux was a Program Manager in the Office of Energy Efficiency and Renewable Energy where she worked with industry to collaboratively develop vision and roadmap documents, managed research and development programs, and tracked impacts of technology applications. She directed programs for the mining and extractive metallurgy industry, the concrete industry, and materials for the automotive industry. She was also a project manager at NASA, where she researched superalloys and refractory metals for space applications. Finally, in her first professional position, she supervised cold-rolled steel testers and inspectors at National Steel.

In addition to serving in many capacities supporting professional societies in materials science, Dr. Marechaux has served as a judge for the XPRIZE Foundation, and has judged many local and regional science fairs, including the national Regeneron Science Talent Search. She graduated from the University of Illinois with a B.S. in Metallurgical Engineering and from Case Western Reserve University with a Ph.D. in Materials Science and Engineering. She maintains an abiding interest in abolishing barriers to new technology applications and in engineering solutions for sustainable development.

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Abstract

Striving Toward a Circular Economy: Challenges and Opportunities for Metals Processing

The concept of a circular economy is influencing more and more materials production and use. While the processing of metals and minerals can be damaging to the environment, their inherent strength, durability, and corrosion properties clearly improve the performance and longevity of products in which they're used. Metals are infinitely recyclable, with a high value that drives the recovery of such materials at the end of a product life cycle. Many companies are looking to new technologies to help eliminate waste (because any pollution is a product you're not selling!) and increase productivity and efficiency through sustainable processes. From designing products for high performance, durability, and recycling, optimizing the use of raw materials, and capturing and using waste streams, there are many new materials technologies of growing interest. Let's look at both the low-hanging fruit and the long-term research that will move this concept forward. Examples in the steel, aluminum, and titanium industries will be discussed.

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Abstract

The Top 10 Ways Materials Science and Engineering Has Evolved

There are many ways that materials science and engineering has changed since the 1970s -- when “Materials and Man's Needs” was written and the MSE discipline emerged at the intersection of extractive metallurgy, mechanics, solid state physics, and physical chemistry. New departments arose in many industrial, academic, and government institutions, and new materials were changing the world. Let's look at where "materials science and engineering" is today; where people work, what they do, and how they do it; what has changed, and what is still changing. Attendees are invited to propose their own top 10!