Tuesday Morning, May 13, 2025

Focused Topic Session
Room Town & Country B - Session FTS-TuM

Focused Topic Session I

7:00am **FTS-TuM-1 American Elements Focused Topic Session: Metal-Based Coatings and Alloys: Innovations, Challenges, and AI-Driven Advancements at American Elements**, ***Chad Lindner [chad.lindner@americanelements.com]***, American Elements, USA

Metal-based coatings and alloy coatings play a critical role in enhancing durability, wear resistance, and corrosion protection across industries such as aerospace, automotive, and energy. This presentation explores the latest advancements at American Elements in metallurgical coatings, addressing key challenges and emerging solutions through materials science innovations and artificial intelligence (AI).

Key topics include high-performance alloy coatings, such as high-entropy alloys (HEAs) and NiCr-based thermal spray coatings, which exhibit superior oxidation resistance and longevity. Case studies highlight successful implementations, including HEA coatings in aerospace turbine components and AI-optimized electroplated alloys for automotive applications. The discussion extends to industry challenges such as corrosion resistance, adhesion issues, and sustainability concerns, which are driving the shift toward environmentally friendly alternatives to traditional chromium-based coatings.

At American Elements AI is revolutionizing the field by optimizing coating formulations, predicting material performance, and enhancing quality control. Machine learning algorithms improve electroplating consistency, while AI-driven process monitoring minimizes defects in thermal spray applications. These innovations are accelerating the development of our next-generation coatings with improved efficiency and reduced environmental impact.

By integrating advanced materials science with AI-driven approaches, the metallurgical coatings industry is poised for transformative growth. This presentation provides insights into cutting-edge research, industry trends, and future directions at American Elements in metal-based coatings, paving the way for more sustainable and high-performance solutions.

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