Submittal #009:

STAINLESS CLAD STEEL REBAR: REDEVELOPED FOR RESILIENCE & SUSTAINABILITY

Abstract:
The corrosion of reinforcing steel is one of the primary lifetime-limiting factors for concrete bridges, and solving this challenge in a cost-effective and scalable manner is pivotal to achieving more resilient and sustainable concrete bridges going forward. This problem is also particularly acute in coastal regions which are most likely to be affected by climate change. One approach to this problem, currently under development by Allium, is to introduce a surface cladding layer of stainless steel around an inner core of carbon steel in order to achieve corrosion resistance equivalent to stainless steel rebar, while minimizing cost to the extent possible and preserving the beneficial mechanical properties of steel. This basic idea was previously explored by a UK-based developer, and resulted in the establishment of an AASHTO Materials Specification, M 329M/M 329-11 (2019), but no domestic or international commercial supply has meaningfully been established. Allium is currently partnering with Steel Dynamics Inc. to pilot and scale-up production of this new type of steel reinforcement at a mill in Columbia City, IN. This presentation will focus on Allium's technology and innovation in comparison with previous efforts to manufacture stainless-clad rebar. Initial results from early manufacturing trials, microstructural characterization of the steel, and corrosion performance assessment with rapid macrocell testing will be presented. Implications for resilient and sustainable concrete bridge design and construction will be discussed.

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Bio:

Co-founder and CTO of Allium Engineering, Inc. PhD in Nuclear Science and Engineering from MIT, focused on designing novel materials for advanced nuclear energy applications. At Allium, he focuses on developing the core technology using metallic composite materials to improve the performance and lifetime of materials in a wide spectrum of applications including infrastructure, energy, and aerospace. He is also passionate about STEM education, with a multitude of teaching experiences at MIT, and hopes to play a role teaching and mentoring the next generation of scientists and engineers.