NSF NANOSCALE SCIENCE AND ENGINEERING GRANTEES CONFERENCE:
NANO AND AI CONVERGENCE
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"Forging FAIROS from Materials Science Cyberinfrastructure"

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Position title
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Bio: David Elbert is a Faculty Research Scientist at Johns Hopkins with particular focus on innovation in data infrastructure using data modeling, streaming, and AI/ML to accelerate materials discovery, design, and deployment. He works on quantum materials, spall-resistant alloys, recycled polymers, scalable catalysts, armor materials, certifiable additive manufacturing, digital twins, and high-throughput modeling and orchestration. David is Chief Data Officer of the NSF PARADIM Materials Innovation Platform (MIP) and a PI or Co-PI on multiple projects including two NSF DMREF awards; an NSF OAC Data CI pilot; the Data at the Speed of Extreme Materials Discovery project supporting two ARL/DEVCOM High Throughput Materials Discovery Centers; and the NASA IMQCAM Space Technology Research Institute. David is a co-founder of the Materials Research Data Alliance (MaRDA) and lead PI of the Materials Research Coordination Network, an NSF FAIROS-RCN

Abstract: Data is the lifeblood of the AI revolution, driving learning and reasoning to empower digital twins, autonomous laboratories, and new insights for innovation and discovery. The Materials Genome Initiative (MGI) calls for synergy between large-scale data availability, advanced algorithms, and powerful computational resources. This synergy is fueled by community alliances and innovative cyberinfrastructure that transforms scientific research that now includes traditional data companies like Meta, Google, Apple, and Microsoft. Development of critical data resources, however, rely on community collaboration and cyberinfrastructure to facilitate FAIR and Open Science approaches across research types and scales.

The NSF Materials Research Coordination Network (MaRCN) leverages the burgeoning Materials Research Data Alliance (https://marda-alliance.org) alliance of data stakeholders to advance FAIR materials data, AI and models through community development and infrastructure development. MaRCN FAIR Data efforts have created frameworks for metadata development in electron microscopy and laboratory information management. FAIR Train efforts focus on workforce development with a focus on creating shared FAIR curriculum concepts and content. FAIR models and AI provide leadership in new AI advances. A central tenet of FAIROS development is bridging grassroots efforts with agency mission priorities. Communities of research, like the NNI, provide a powerful opportunity to link large-scale missions with centralized nanofab facilities to create interoperable data, cyberinfrastructure, and community alignment. Centralize facilities provide fertile sources of foundational data and user training that can spark community growth and transformative gains.