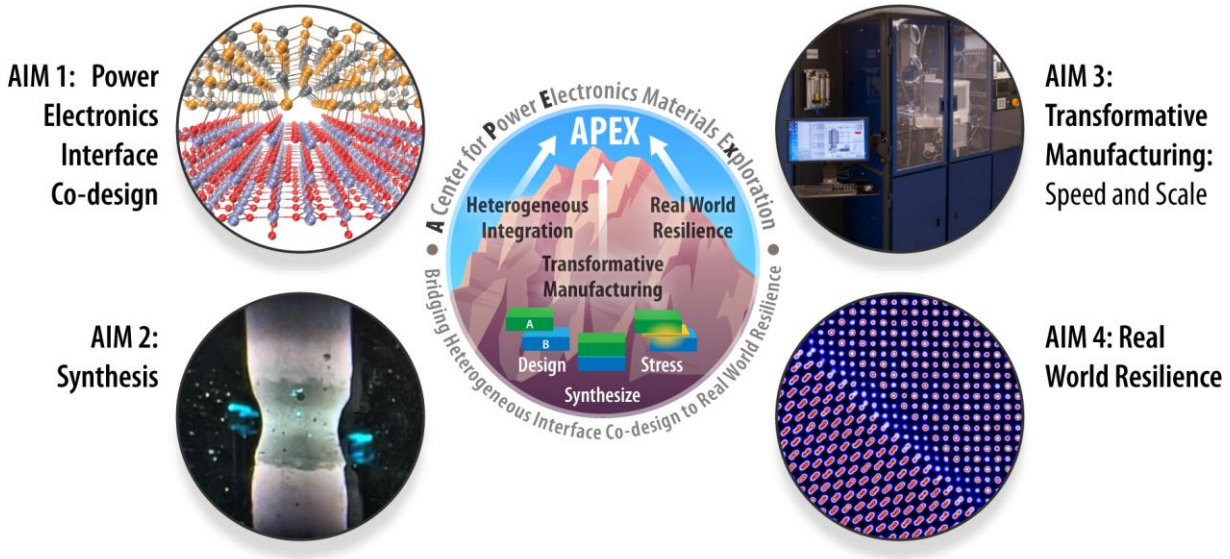
A Center for Power Electronics Materials and Manufacturing Exploration (APEX)

Nancy M. Haegel (NREL); Class: 2024-2028

MISSION: To expand interdependent materials and manufacturing choices for substrates, ultrawide-bandgap semiconductors, contacts, thermal sinks, and critical interfacial layers and advance fundamental understanding of structurally, chemically, thermally, and electrically dissimilar interfaces.



RESEARCH PLAN: Next-generation power conversion technologies have the potential to significantly improve energy efficiency and reduce global energy consumption. APEX focuses on four areas of research: (1) co-design of interfaces for broader integration of heterogeneous materials, (2) synthesis of novel materials combinations, (3) transformative manufacturing through hydride vapor phase epitaxy for speed and scale, and (4) understanding of interfacial phases, reactions, and degradation mechanisms to further knowledge for real-world performance and resilience.