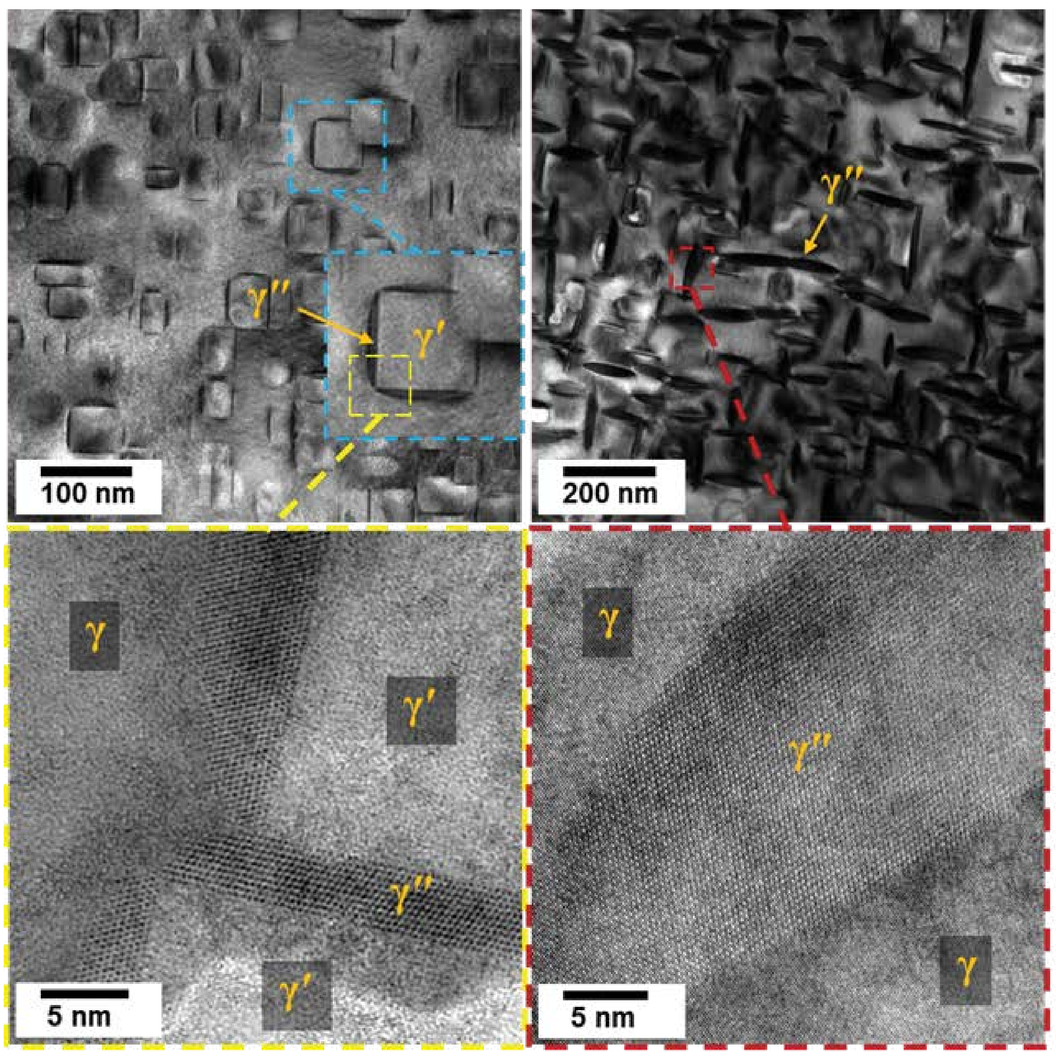
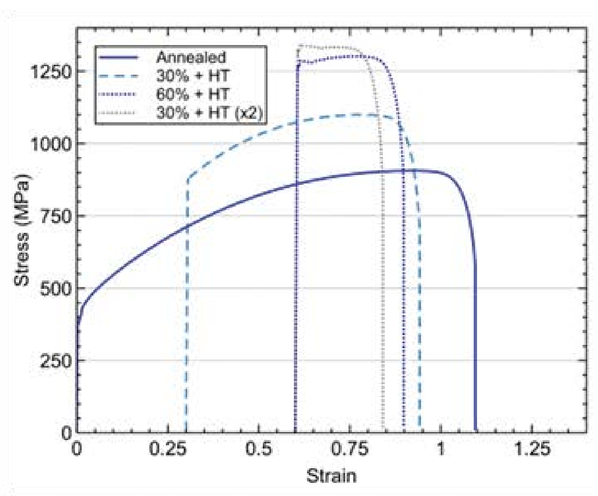
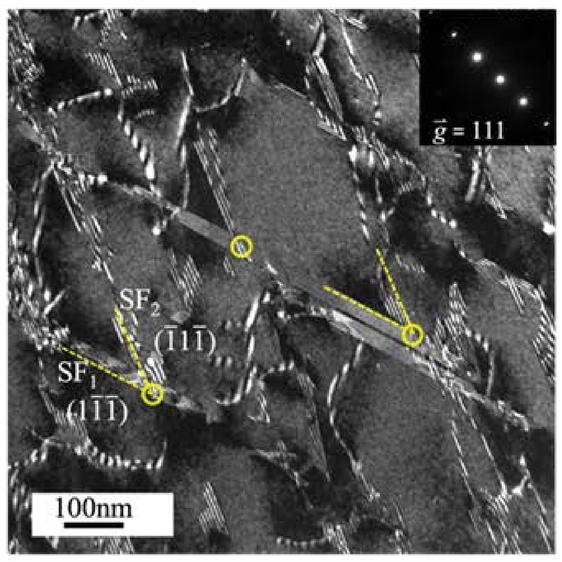
Next-Generation Alloys with Superior Performance for Service in Hydrogen Environments

NETL's patented 725 alloy with increased strength (33%) and creep life (~ 250%) compared with commercial IN 725.







Engineered alloy microstructures with hydrogen trapping sites.

Hydrogen has a deleterious impact on the mechanical performance of most metallic materials. Alloys with improved resistance to hydrogen will enhance the safety and reliability of components operating in hydrogen environments. NETL is developing hydrogen-resistant alloys for transport (pipeline), hydrogen utilization, and power (hydrogen turbines) applications.

- NETL uses fundamental understanding, computational optimization, and advanced characterization to design and engineer alloy microstructures at the atomic scale to trap hydrogen and prevent embrittlement.
- NETL's Advanced Alloys Signature Center allows for the demonstration of precise microstructural control with processes and at scales that easily transfer to industrial practice.
- NETL's patented 725 alloy increases room-temperature strength (33%) and elevated temperature creep life (~ 250%) compared with commercial IN725.
- Increase in strength is achieved without loss of ductility, which is critically important for hydrogen resistance.
- NETL alloy 725 is being evaluated by Naval Research Lab and Sandia National Laboratories for corrosion and hydrogen applications.

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DOE PROGRAM

Hydrogen with Carbon Management

NETL-R&D-FECM-HCM-000039