



Hydrogen Structural Materials

<Goal>

- Understand **fundamental interactions** of hydrogen with metals and alloys
- Design **materials** with known **resistance to hydrogen embrittlement**

<Roadblock>

Lack of understanding of **degradation mechanisms and the way they bring about material failure**

<Approach>

Synergistic **experimental and computational methodologies** to discover

- fundamental mechanisms of fatigue
- Hydrogen **adsorption rates**
- Effects of local hydrogen **concentrations** on the local **electronic structure, lattice cohesive strength, strength of internal interfaces**

- Interaction of hydrogen with dislocation cores
- Hydrogen in constitutive material model
- Mechanical and chemical process at tribo-interface

