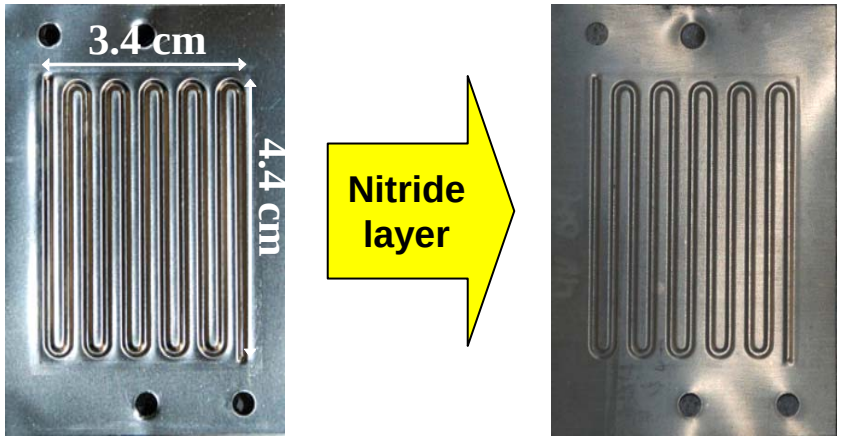
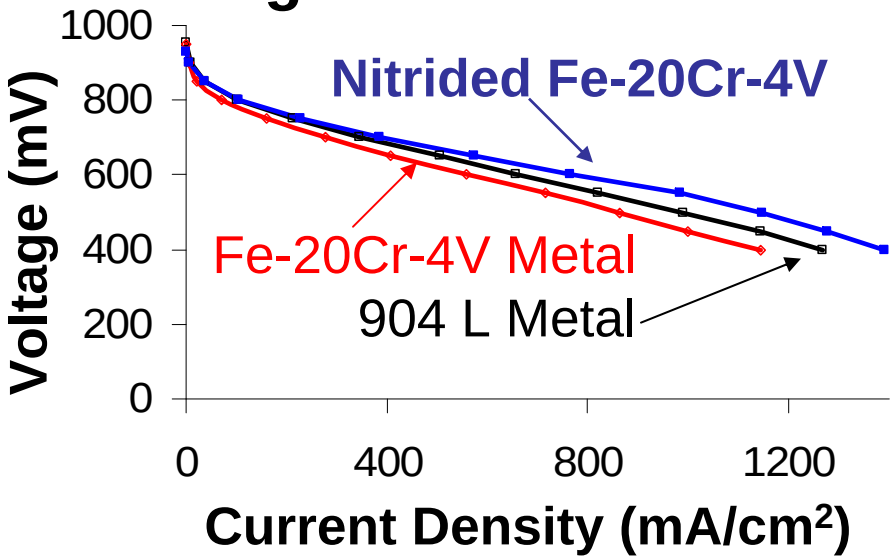
ORNL Has Developed Unique Nitriding Approach to Protect PEMFC Bipolar Plates

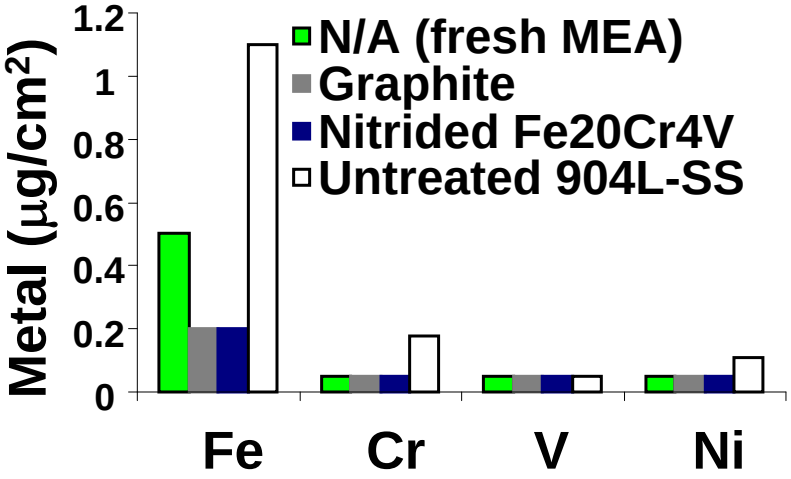
Fe-20Cr-4V Stampings



Single-Cell V-I Curves



XRF of MEA: 1000 h Cyclic Testing



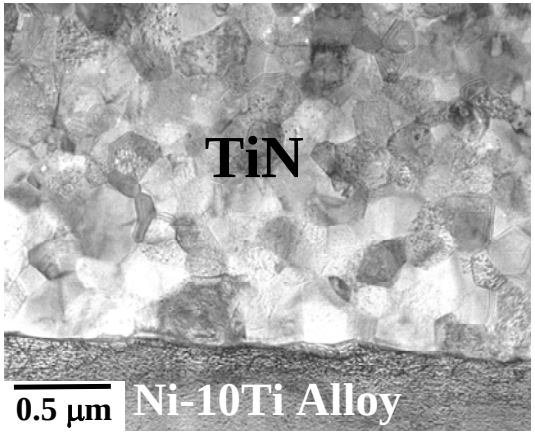
-Low Contact Resistance

-Resists Corrosion

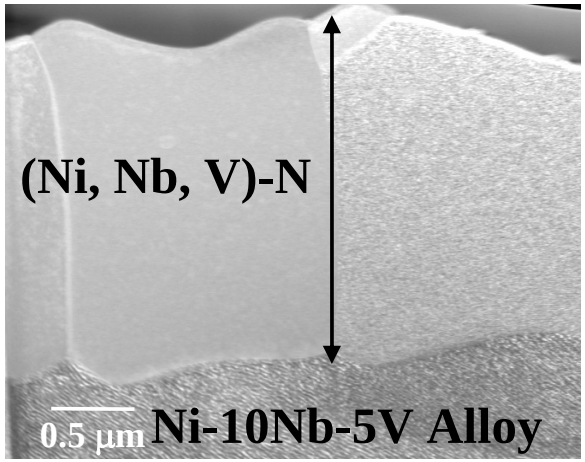
-Low-Cost Approach

Wide Range of Unique Surfaces From ORNL Alloy Oxidation/Nitridation/Carburization Approaches

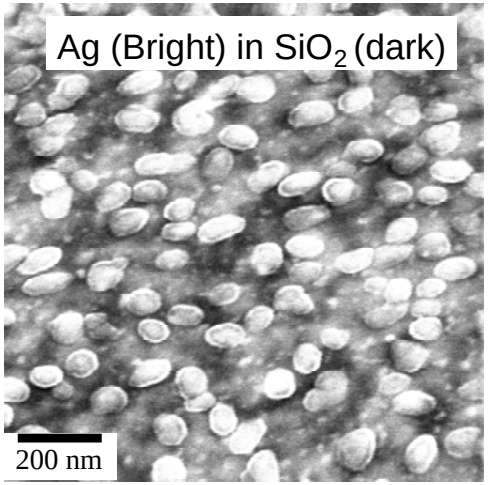
Nitridation→ Simple Nitride



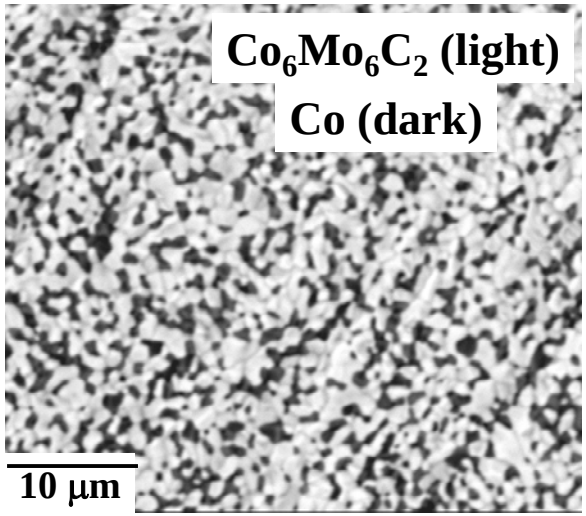
Nitridation→ Complex Nitride



Oxidation→ Simple Metal/Oxide Nano Composite



Carburization→ Complex Metal/Carbide Nano Composite



Many Potential Applications

- Potentially applicable to any product form substrate alloy can be made in: powders, foils, thin films, bulk shapes

- Not line-of-sight limited: high-temperature process converts all surfaces accessible by gas (no pin-holes)

- Ideal for applications requiring low contact resistance and high corrosion resistance (form nitride, carbide surfaces)

- Limited to high temperature processing (> ~600°C) and carefully designed precursor substrate alloys
  - -surface conversion not an applied coating

Contact: Michael P. Brady; bradymp@ornl.gov