Additively Manufactured Metal Alloys and Advanced Coatings Systems for Corrosion Control

Goal: To better understand how the chemical structure and surface interactions of advanced coating systems impact electrochemical corrosion resistance of aerospace aluminum alloys prepared by 3D printing.

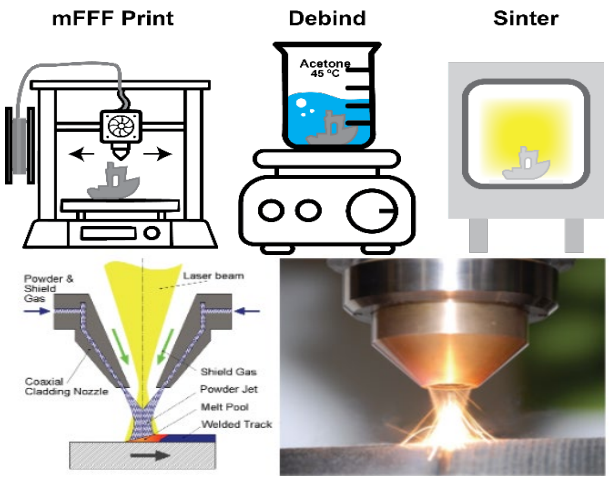
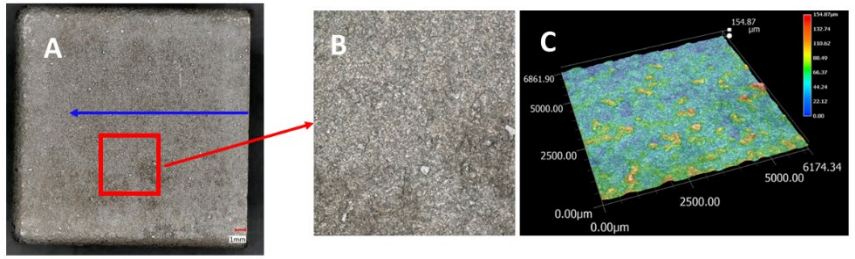


Figure 1: Additive manufacturing of parts using mFFF and LMD.

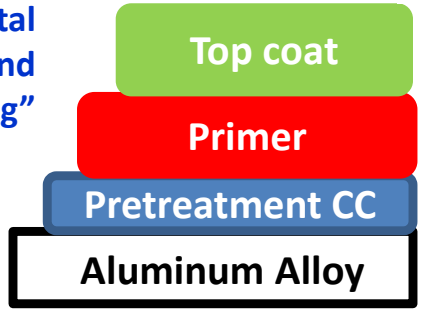
Students will learn about material characterization, electrochemical measurements to assess corrosion resistance offered by different "green coating" systems, and data analysis and interpretation.

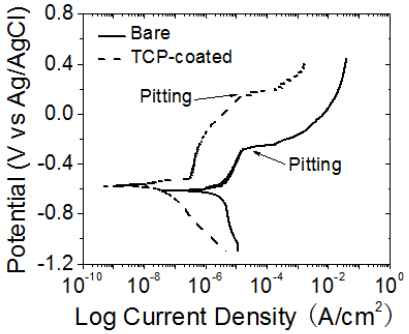
Aluminum and titanium alloys are being prepared by fused filament fabrication (FFF) and selective laser melting (LMD).



$AlSi_{10}Mg$

Multilayer coating systems are used to protect metal alloys from corrosion and degradation. "Green coating" systems are being studied.





0.5 M Na_2SO_4 + 0.05 M NaCl

Electrochemical measurements reveal reduced oxidation and reduction currents for the "green" coated aluminum alloy (TCP-coated).