Flow Battery Structures to Improve Performance/Reduce Manufacturing Cost

**Goal/Objective**

Develop, demonstrate and commercialize a versatile, low cost manufacturing process for fabrication of flow battery plate components enabling improved performance and reproducible integration of stack components:

- **Versatile** ➔ applicable to most flow battery systems
  - Materials Ti, Ta, Alloys, SS, carbon/graphite
- **Low cost manufacturing**
  - Pattern/feature flexibility for R&D optimization
  - Low Rate Initial Production (LRIP) trials
  - Volume manufacturing

**Low Cost Pattern/Feature Definition**

- Bare Metal
- Resist Application
- Exposure
- Counter electrode
- FARADAYIC Etch
  \[ M \rightarrow M^{\text{ox}} + n\text{e}^- \]
- Develop
- Strip

**FARADAYIC® ElectroEtching/ElectroCell**

- Forward pulse
- Time off
- Reverse pulse
- Anodic (+)
- Cathodic (-)

**Initial Activities & Future Work**

- Modeling used to identify feature size and shape to enhance the limiting current density while minimizing pumping power for flow batteries
- Experimental work in progress to fabricate plates for performance tests in relevant test systems
- Manufacturing cost assessment for high volume production completed
- Establish design rules for FARADAYIC® ElectroEtching for various metals and surface features
- Manufacturing cost assessment for low volume production