

JSC Senior Design Project and or Intern Request Form

Project Title:	Internal short circuit device maturation		
Project Description:	This joint NREL-NASA invention of an on-demand internal short circuit device that is implantable into Li-ion cells needs maturation of the design to lower the rate/risk of premature activation. Perform dry and wet activation tests of devices to establish consistency and reliability of the ISC device design.		
Choose most appropriate area of research:	<input checked="" type="checkbox"/> Planetary Surface Systems <input checked="" type="checkbox"/> Ground Operations <input type="checkbox"/> Propulsion <input checked="" type="checkbox"/> Spacecraft <input type="checkbox"/> Human Health Program		
Program Applicability	<input checked="" type="checkbox"/> ISS <input checked="" type="checkbox"/> CEV/SLS <input checked="" type="checkbox"/> Commercial Crew <input checked="" type="checkbox"/> Asteroid <input checked="" type="checkbox"/> Adv. Technology (AES/STMD)		
Choose one project:	Roles and Responsibilities of Senior Design POC/Mentor		
<input checked="" type="checkbox"/> Senior Design	I have coordinated with my management and I am able to support at least three (3) teleconferences (kick-off, mid-term, and final) with a Senior Design Project Team at a university that chooses my project. I understand that I shall not provide any sensitive or classified information to the Senior Design Project students of faculty. I will provide feedback to the project team if requested.		
<input type="checkbox"/> Internship	I have coordinated with my management and I am able to support an intern. If an intern is selected for my project, I will provide an environment where an intern can grow and we may have a mutually beneficial and successful internship. My project will be able to provide a desk space, work area, and computer for an intern. I will review any final report or presentation that the intern generates during his/her internship and submit it to Export Control (DAA) for approval. This project opportunity will be posted in OSSI, through the office of Education (use exact same title). OSSI website: : https://intern.nasa.gov		
Check desired Timeframe for Internship:	<input checked="" type="checkbox"/> Year long <input type="checkbox"/> Summer <input type="checkbox"/> Fall <input type="checkbox"/> Spring		
Check desired Major/Minor(s) for Internship:	<input type="checkbox"/> Aerospace Engineering <input type="checkbox"/> Aeronautical Engineering <input type="checkbox"/> Astronautical Engineering <input type="checkbox"/> Biomedical Engineering <input checked="" type="checkbox"/> Chemical Engineering <input type="checkbox"/> Civil Environmental <input type="checkbox"/> Health Engineering <input checked="" type="checkbox"/> Electrical, Electronic Engineering <input type="checkbox"/> Computer Engineering <input type="checkbox"/> Engineering Physics <input checked="" type="checkbox"/> Industrial Manufacturing Engineering <input type="checkbox"/> Materials, Metallurgical Engineering <input checked="" type="checkbox"/> Mechanical Engineering, Mechanics <input type="checkbox"/> Nuclear Engineering <input type="checkbox"/> Astronomy, Astrophysics <input type="checkbox"/> Chemistry <input type="checkbox"/> Optics <input type="checkbox"/> Physics <input type="checkbox"/> Atmospheric Sciences <input type="checkbox"/> Geography <input type="checkbox"/> Geosciences <input type="checkbox"/> Oceanography <input type="checkbox"/> Natural Resource Management <input type="checkbox"/> Mathematics, Applied Mathematics <input type="checkbox"/> Computer Science <input type="checkbox"/> Astrobiology <input type="checkbox"/> Biology <input type="checkbox"/> Biochemistry/Biophysics <input type="checkbox"/> Microbiology Bacteriology <input type="checkbox"/> Chemical Engineering <input type="checkbox"/> Other, please specify:		
Mentor Name:	Eric Darcy	Mentor's E-mail:	Eric.c.darcy@nasa.gov
Title & Organization:	Propulsion and Power Division	Phone #:	281.483.9055
Alternate POC/Mentor Name:		Alternate's E-mail:	
Education Office Signature and Date:		Intern Mentor's Signature & Date:	
As supervisor/manager, I approve of the above named individual as Senior Design Project POC of Intern Mentor.		Supervisor/Manager's Signature & Date:	
(For Intern Request Only) As Administrative Officer, I am aware that the above named Intern Mentor has submitted a request for an Intern.		Administrative Officer's Signature & Date:	

EP-2: Internal Short circuit device maturation

JSC POC: Eric Darcy

This joint NREL-NASA invention of an on-demand internal short circuit device that is implantable into Li-ion cells needs maturation of the design to lower the rate/risk of premature activation. We currently are getting 50% failure rates. The purpose of the device is determine which cell designs are most tolerant and vulnerable to internal short circuits to improve the safety of spacecraft batteries. The device works by virtue of a paraffin wax insulator that melts when the cell is heated to ~60 degC. The challenges that remain to mature the device are as follows; a. Determine a wax formulation that can be spin coated into a ~20 micron thickness on an Al substrate and withstand 15 psia with minimal cold flow, be flexible (minimal cracking or flaking), and be compatible with Li-ion electrolytes. b. Establish a method for spin coating this wax formulation into a uniform thickness in the 20-30 micron range over a 2" diameter minimum. c. Determine a way to laser cut Al substrates that are wax coated into 7/16" discs while creating minimal edge burrs. d. Perform dry and wet activation tests of devices to establish consistency and reliability of the ISC device design.