

Multi-layer Aerosol Deposition for converting a UAV's body into a solar panel Dr.

Ranganathan Gopalakrishnan, Dept. of Mechanical Engineering and Dr.

Jingbiao Cui, Dept. of Physics and Material Science

Executive Summary: *The UAV/drone manufacturing business is headed towards solar energy as a compact, efficient power source for long flights and higher payload capacity. In this project, an earth abundant and environmentally friendly material called Perovskite that has generated a lot of interest recently is proposed for outfitting drones and aircrafts with solar cells through an innovative direct printing technique. Unlike current manufacturing methods, i.e. mounting the prepared solar cells onto the drones, the proposed approach involves direct spray coating of solar cells on an UAV's surface (on top of the painted surface as a thin layer) with a very small energy and environmental footprint. For this purpose, Perovskite will be synthesized as nanoparticles and sprayed onto surfaces using the Aerosol Deposition Technique. The resulting solar cells on the drones and aircrafts will have strong adhesion with the surface, light weight that is critical for this type of applications, and low cost for mass production. The proposed approach does not require any device mounting and modification to the existing design of a vehicle surface and can be used to turn an entire fleet into mobile power stations that can result in significant savings over the lifetime of each vehicle (UAV/airplane/delivery truck). After proof of concept is demonstrated in controlled lab experiments, collaboration with FedEx Aircraft Operations is proposed to field test the proposed spray deposited solar cells. Data generated in this project will be used to pursue external grant opportunities identified in the write up. Active effort to reach out to FedEx, local partners interested in transportation efficiency will be undertaken.*