Contribution ID: **36** Type: **Poster Only**

Optimizing the Manufacturing of Inkless Printed Electronics with Machine Learning Models

We present a machine learning approach for manufacturing printed electronics, enabling users to enter a target resistivity and receive optimized printing parameters to achieve it. The process is based on a dry additive nanomanufacturing (Dry-ANM) technique that produces pure nanoparticles via pulsed laser ablation. These particles are directed via argon through a nozzle and sintered in-situ onto a substrate. For this study, pure silver and copper were printed on a Polyamide substrate. Design of experiment algorithms were developed and optimized for incorporating new materials in the machine learning algorithm. Multiple machine learning models were trained to obtain relationships between process parameters and final resistivity. A search strategy study was then conducted using an ML algorithm to predict printing conditions with user-specified parameter ranges and target resistivity. Ultimately, it enables rapid and autonomous data-driven development of custom-printed electronics both on Earth and in space.

Topical Area

AI and data science

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