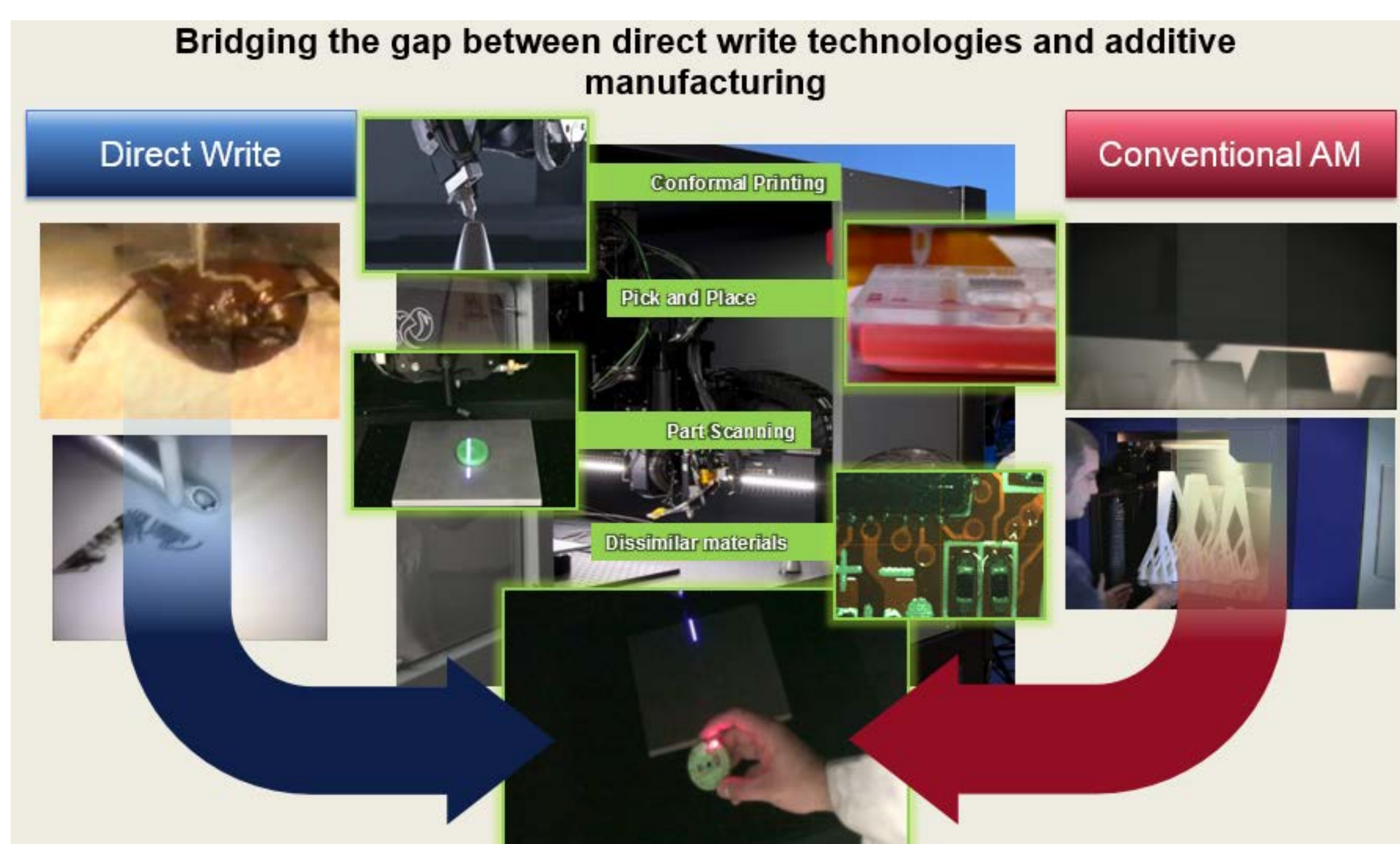


S&T Campaign: Materials Research Manufacturing Science Advanced & Additive Manufacturing

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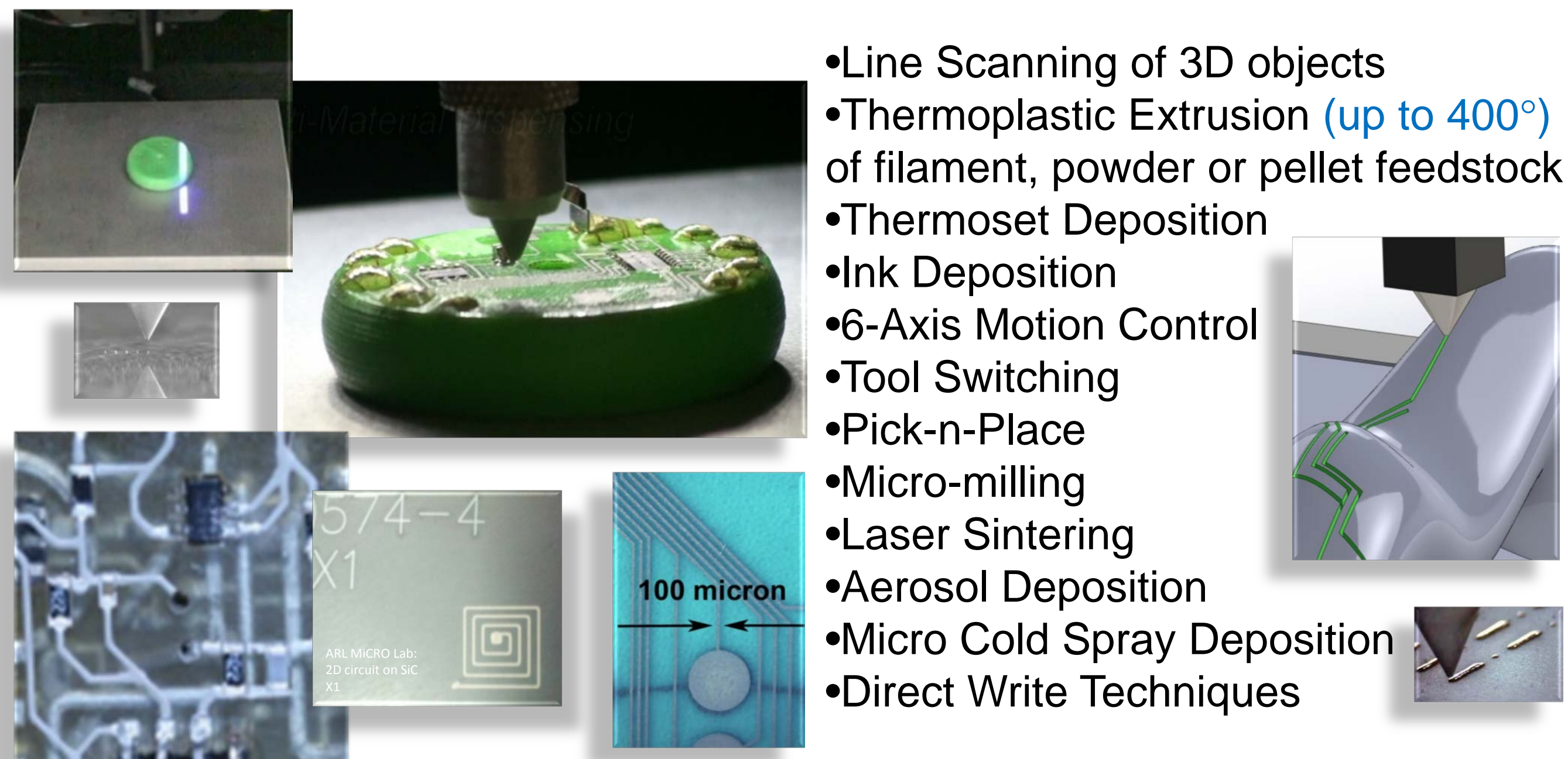
Research Objective

- Control material-process-property relationship to allow for the fabrication of devices that have **functionality beyond structural**
- Process characterization to feed process modeling that will aid in the **prediction of effects of AM**
- Apply research to **field-ready applications** to reduce the Army's logistical burdens



Challenges

- Many current COTS materials are not applicable to future Army systems
- In-situ characterization is complicated by processing energies and environments required in these manufacturing systems
- Process modeling and simulation is slow to catch up to processing technologies



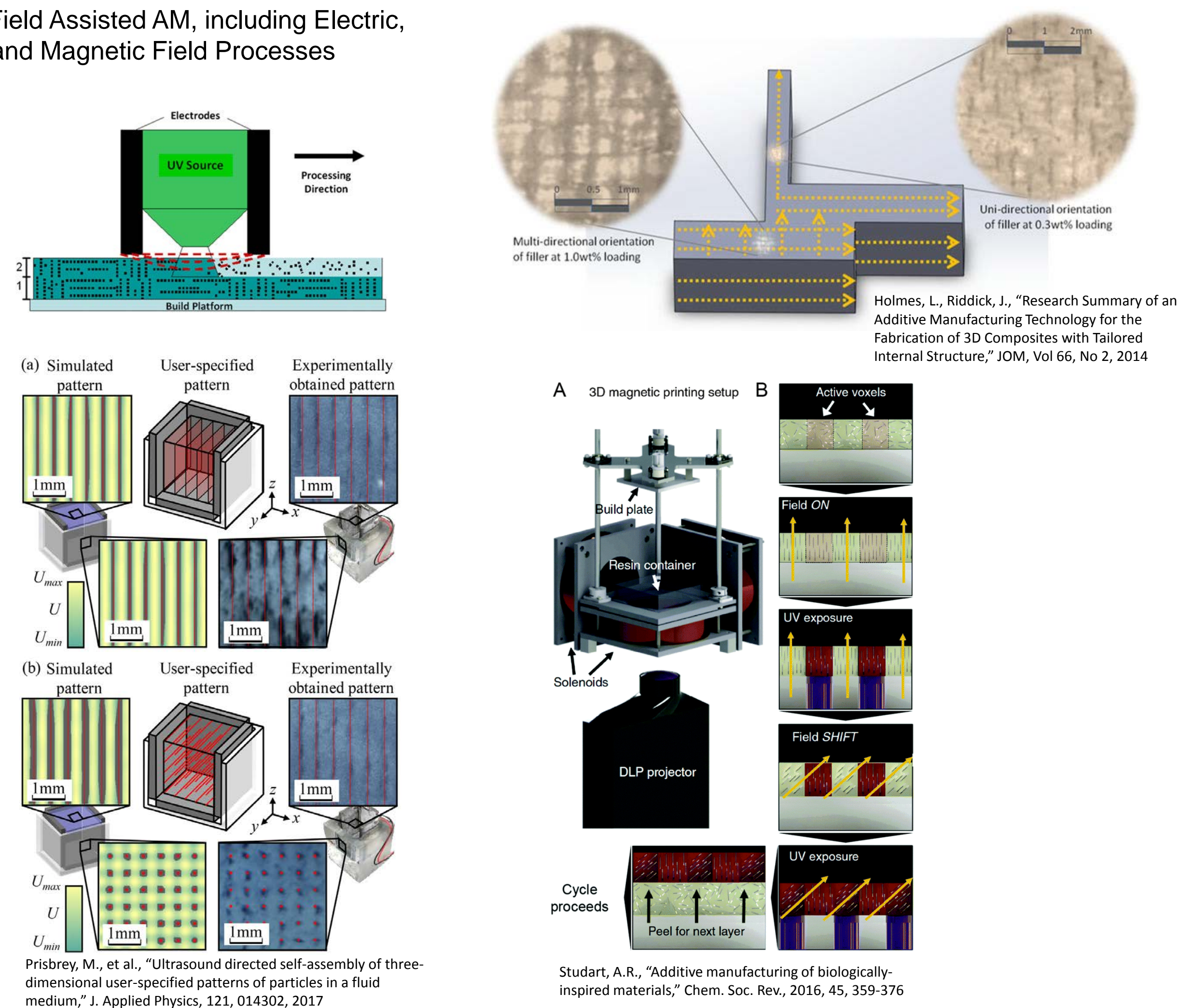
Manufacturing Science that provides the Warfighter field-ready technologies that are able to make functional devices at the Point-of-Need



ARL Facilities and Capabilities Available to Support Collaborative Research

- Full and open access to ALL of the processing parameters for all of the DW and AM equipment in CAMMS
- Feedstock pedigree is 100% verifiable for the AM compliant polymers, metals, and ceramics that are created in-house
- Fabrication of complex and/or functional devices
- Field-aided vat polymerization for tailored internal structure of 3D composites
- Fiber reinforced thermoplastic micro-extrusion
- Multi-material vat polymerization
- Capillary Cold Spray
- FDM, SL, DLP-SL, SLS, DMLS, LOM

External Field Assisted AM, including Electric, Acoustic and Magnetic Field Processes



Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- In-situ characterization of matter-energy interaction
- Process modeling for geometric, topological, and on-the-fly optimization
- Field-aided processing: electric field, magnetic field, acoustic field, etc.
- Materials and process development: conductive (5+ $\mu\Omega/\text{sq}$), dielectric (50+ κ), exotic, etc.
- Design/development of conformal and awkward passive devices