



Game Changing Development Program Office

Low Cost Upper Stage-Class Propulsion

**Using additive manufacturing to develop
high pressure/high temperature combustion chambers
and nozzles with copper alloys**



Technology Innovation Opportunities of the LCUSP Program

- Address selective laser melting technology with copper and demonstrate the concept by designing, manufacturing and testing the critical components of a rocket engine.
- Manufacture complex components rapidly
- Demonstrate a hybrid processing process using selective laser melting (SLM) and Electron Beam Freeform Fabrication (EBF3) with NASA developed GRCop
- Reduce cost and schedule if these challenges can be solved



MSFC partnering with LaRC (for the EBF3 jacket/manifold deposition) and GRC (for materials properties determination)