Report Out

June 10, 2016

Breakout Out Group:

Materials Characterization

NIST

Desired AM Capabilities/Technologies

- Predictive Capabilities
  - Correlation of materials properties with process parameters
  - Prediction of material/mechanical properties from starting material characteristics
- Properties Databases
  - Compatibility with conventional parts
  - Shelf life of filaments
  - High temp polymer chemical/performance data to integrate into design/predictive models
- PB Materials
  - Ability to purchase standardized filament material
  - Class of materials to replace injection-molded parts over long term
  - How to tailor materials voxel-by-voxel
- Materials Processing/Printing
  - True 3D printing
  - Engineering control to get a range of properties from a single feedstock
  - Printing processes/materials with no/less post-processing
- Life Cycle
  - Understand cradle to grave impacts of PB AM materials
  - Traceability of part, recycle history

Top-Voted Challenges/Priority Topics

- Standardized Materials – create reference materials, material standards for PB AM materials
- Closed Loop Systems – develop materials-machine parameter standards – could be platform for research grade equipment
- Large (ginormous) Variable Problem – understanding and resolving the important key variables, gaining key knowledge, data
  - Experimental data on part lifetime/aging
  - Impacts of process/materials parameters on finished part
- Materials Characterization – characterizing shear and other key properties contributing to non-equilibrium
- Benchmarking Materials – from nm to mesoscale, and at interfaces