Material Advantage

Meeting: 4/16/2021

Meeting time: [11:00 – 11:30] am

Key Notes:

* Nathan Jerred came to talk about his experience at INL as a materials engineer
* Undergrad in MSE and metallurgy engineering
* PhD in nuclear engineering
* In the Advanced Fuels Manufacturing and Development Group at INL
* New approaches to nuclear engineering with space applications
* SLA (Stereolithography) process
  + Laser sketches each pattern in UV curable resin
  + Resins with ceramic powder
  + Used for complex geometries
  + Have to be debinded and sintered
* Digital Light Processing (DLP)
  + Uses 405nm light to cure an entire layer at once
  + Higher solid loading for resin
  + Complex ceramic based designs
* Laser Engineering Net shaping (LENS)
  + Used for non-conventional fuel geometries
  + Can be used for variable internal structuring and variable surface finishing
* Spark Plasma Sintering (SPS)
  + Used for fast consolidation of materials to near theoretical densities
* NASA TREAT Irradiation
  + Nuclear Thermal Propulsion (NTP)
  + For manned spaceflight beyond the moon