1154-62-2564 **William Rosenthal*** (william.rosenthal@pnnl.gov) and **Francesca Grogan** (francesca.grogan@pnnl.gov). *"Sintering" models and measurements: data assimilation for microstructure prediction of nylon component SLS additive manufacturing.*

Selective laser sintering (SLS) printers drive high-throughput polymer additive manufacturing. However, thermal, feedstock, and exposure variations can introduce significant microstructure variability in the same batch of components. Phase-field models have been developed to simulate material microstructure evolution and kinetics during synthesis. We develop sensitivity analyses and introduce an adaptive sampling Bayesian algorithm to estimate significant parameters and uncertainties in a 3D phase-field model for nylon-12 polymer synthesis, including system free energy, interfacial energy, and sintering kinetics. In a high-throughput DIRAC-automated computational design loop, we validate the model through comparison to high-resolution 3D CT images of components built with varying orientations throughout the build chamber, as well as to partial sintering artifacts identified by laser exposure metadata. We quantify uncertainties in phase-field initial and operating conditions by developing a stochastic feedstock model from laser diffractometry and 3D CT imaging, and by analyzing real-time infrared thermographic movies taken throughout the build process. (Received September 17, 2019)