CANFSA

Center for Advanced Non-Ferrous Structural Alloys
An Industry/University Cooperative Research Center

Project 44-L: Advanced Characterization of Particulate Materials Simulating High Explosives

Fall Meeting

October 13th – 15th 2020

National Nuclear Security Administration

PSAAP III

- Student: Summer Camerlo (Mines)
- Faculty: Amy Clarke, Kester Clarke (Mines)

Center for Micromorphic Multiphysics Porous and Particulate Materials Simulations with Exascale Computing Workflows, US DOE National Nuclear Security Administration (DOE/NNSA) Predictive Science Academic Alliance Program (PSAAP) III, NNSA Office of Advanced Simulation and Computing (ASC), in collaboration with Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories

NSF

COLORADO SCHOOL OF MINES

IOWA STATE UNIVERSITY

About Me

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Education

- BS in Metallurgical and Materials Engineering from CSM in May 2020

Professional

- Quality Engineering Co-op for DePuy Synthes, Raynham June 2018 – Dec 2018

Personal

- From Colorado Springs, CO
- Hobbies include rock climbing, baking bread, and just enjoying the outdoors!

Project 44-L: Advanced Characterization of Particulate Materials Simulating High Explosives

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- Student: Summer Camerlo (Mines)
- Advisor(s): Amy Clarke and Kester Clarke (Mines)

- Problem: Mock high explosive (HE) deformation characteristics are relatively unknown in the virgin and recycled states.
- Objective: Perform processing and multiscale experiments on the quasi-static to dynamic mechanical response of mock HE to support a 5-year, multi-university exascale computing effort lead by CU Boulder.
- Benefit: Experimental data sets for a range of particulate material responses that will be used for model calibration, verification and validation.

Project Duration

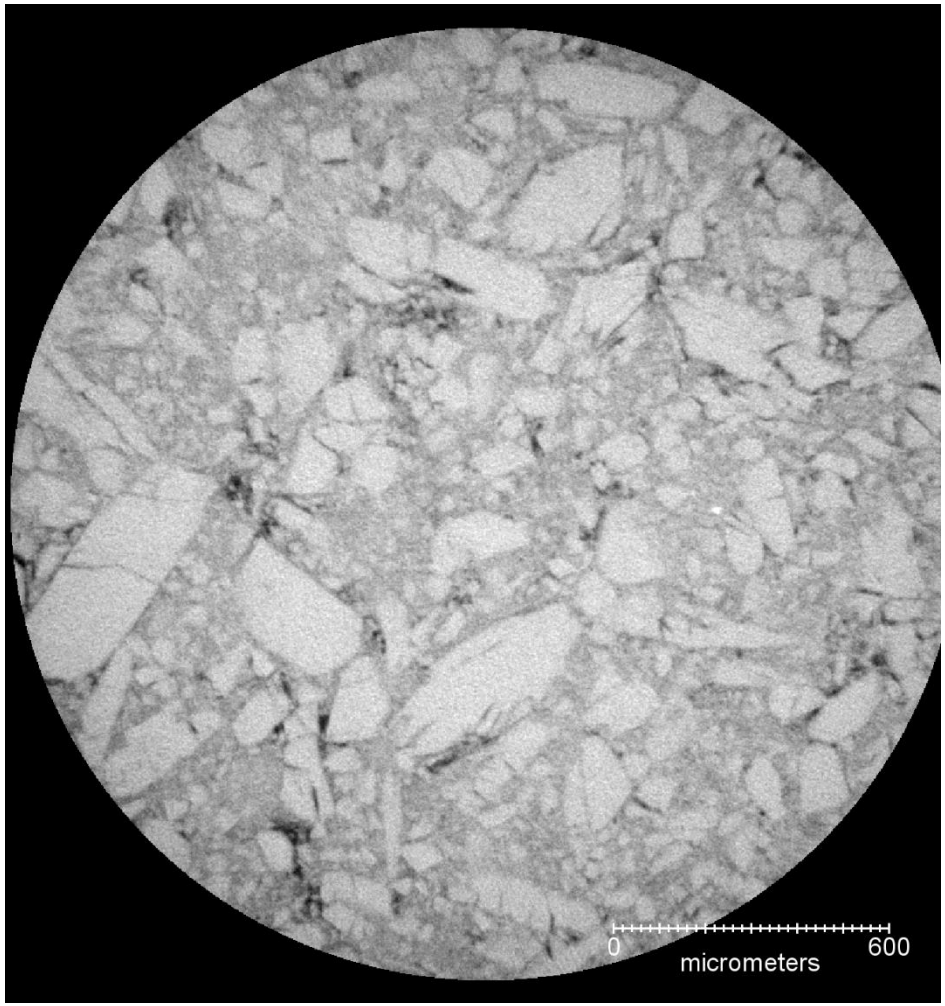
MS: September 2020 – May 2022

Recent Progress

- The creation of particle/matrix samples (Al spheres, glass beads, and sand in epoxy) for initial computed tomography (CT) of sizes and distributions to aid in the setup of a modeling framework.
- Identify suitable binders to serve as matrix materials.
- Micro-computed tomography at Mines on model samples that contain Al spheres embedded in epoxy

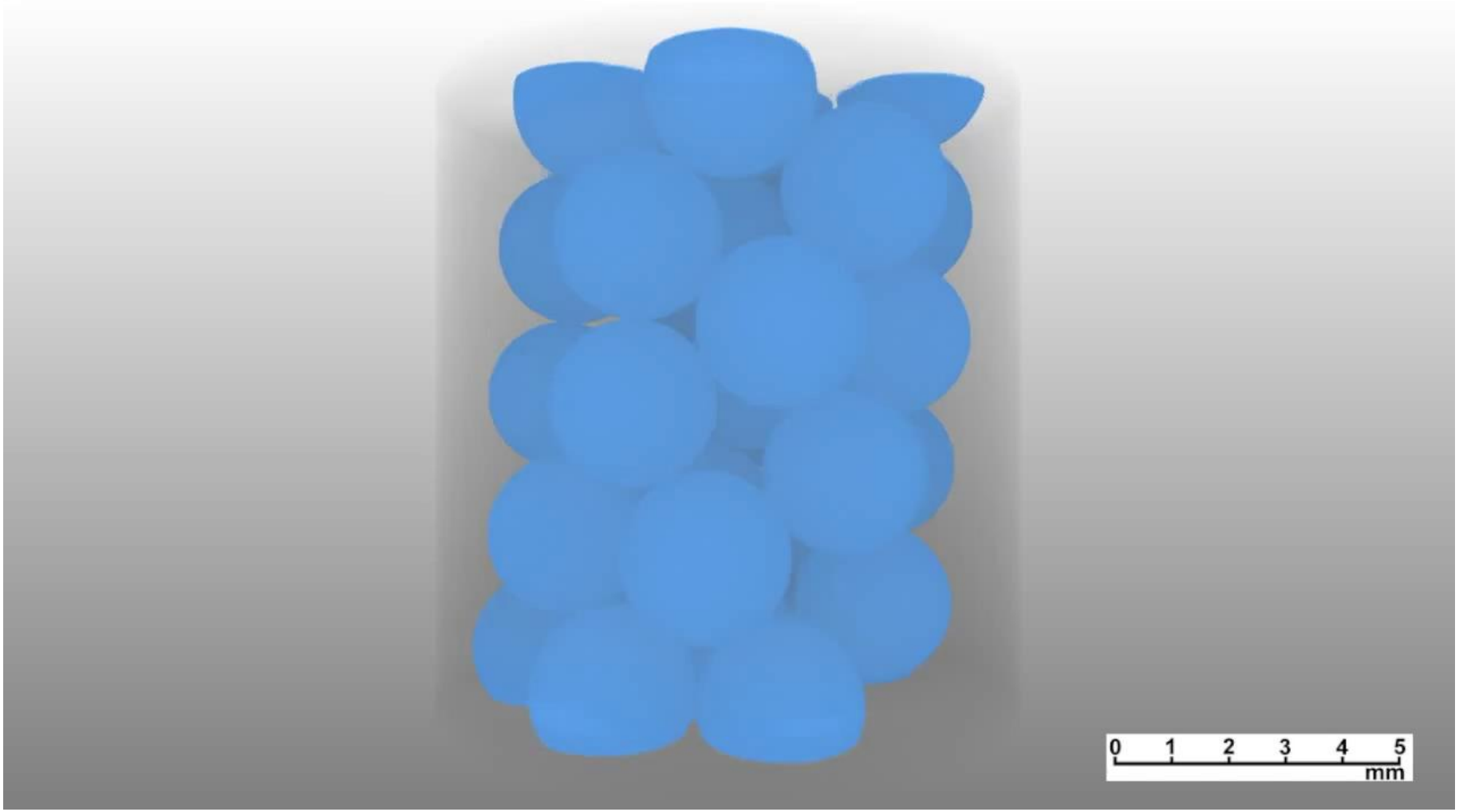
Metrics		
Description	**% Complete**	**Status**
1. Literature review	25%	●
2. Creation of model samples for CT imaging for calibration	10%	●
3. Processing of mock HE and making samples	0%	●
4. CT imaging of mock HE	0%	●
5. Mechanical properties and characterization of mock HE	0%	●

XY Slice Through Example Mock HE: IDOX Crystals + Binder (Micro-CT)



CT POC: Brian Patterson (bpatterson@lanl.gov) IDOX POC:John Yeager (jyeager@lanl.gov)

Rendered Image of Al Spheres in Epoxy for Modeling Framework



Thank you!

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