### Overview

- Gelcasting slurries were formulated using MMA powder, a sintering aid, Isobam-104, and deionized water. Isobam-104, a commercial gelling agent, also acted as the dispersant.
- Slurries with an Isobam-104 content of 1.4% and solids loadings of 46% and 48% were successfully cast into 2.5 cm, 5 cm, and 10 cm square plates at 1 cm thickness.
- Further study is needed to increase the working time of the slurry and better understand the effect of temperature on slurry viscosity.

### Slurry Formulation and Rheology

- The viscosity of the slurries was characterized using a cone and plate apparatus and shear rates varying from 1 to 200 s⁻¹.
- In general, slurry viscosity increased with solids loading and decreased with temperature.
- Viscosity varied within these parameters depending on slurry batch size, time elapsed between mixing and pouring, and temperature of the slurry.

### Sintering

- The highest sintered density achieved was 96.8% using a 50 vol.% Isobam-104 content.
- Parts with a 1.2 vol.% Isobam-104 were crack free after sintering, whereas parts with a 1.4 vol.% content experienced two modes of cracking.
- Cracking attributed to burnout and drying defects.

### Next Steps

- Further rheological characterizations of slurries to understand temperature and time dependence.
- Investigate secondary dispersant to decrease the Isobam-104 content and theoretically increase the solids loading and lengthen the working time.
- Optimize sintering cycle to eliminate cracking.
- Determine design constraints by increasing the complexity of cast parts.