

Oral Qualifying Exam - Ceramics Processing

NON-EXHAUSTIVE TOPICAL AREAS IN CERAMICS PROCESSING

Sintering (e.g., solid state sintering, densification and coarsening mechanisms, grain boundary mobility mechanisms, pore evolution (stability/entrapment), viscous densification, liquid phase sintering, constrained sintering)

Raw Materials (e.g., conventional powders, chemically-derived powders, particle size/morphology characterization, surface area characterization, purity analysis, surface chemistry/characterization, calcination)

Processing Aids

- Spray Drying
- Milling
- Rheological Behavior (e.g., liquids, melts, dilute colloidal suspensions, concentrated colloidal suspensions, flocculated and dispersed systems)
- Forming Science (e.g., pressing operations, slip casting, tape casting, extrusion, injection molding, hot press, HIP, emerging routes (gel-based, solid freeform methods, green body characterization methods)

Drying

Binder Removal

Structure of Ceramic Materials (e.g., bonding, crystal structures, clay structures, glass structure, microstructure)

Properties of Ceramics (e.g., mechanical, electrical, optical, thermal)

LEVEL (BASED ON UIUC COURSES)

MSE 421: Ceramic Processing and Microstructure Development

MSE 420: Ceramic Matls and Properties

MSE 480: Surfaces and Colloids

SUGGESTED TEXTS

J.S. Reed, Introduction to the Principles of Ceramic Processing, John Wiley & Sons (1988).

G. Onoda and L.L. Hench, Ceramic Processing Before Firing, John Wiley & Sons (1978).

R.J. Hunter, Foundations of Colloid Science, Vols. I and II, Oxford Science Publications (1995).

D.H. Napper, Polymeric Stabilization of Colloidal Dispersions, Academic Press (1983).

Y.M. Chiang, D. Birnie, and W.D. Kingery, Physical Ceramics, John Wiley & Sons (1997).

