Low-Temperature Sintering Process ID# 2015-4382





Comparative Sintering Results

Technology Summary

Most sintering processes occur at high temperatures >1000°C. This technology is a protocol to achieve dense ceramic solids at extremely low temperatures (< 300°C) via integrating particle, particle-fluid interface control, and external pressure to allow the cold sintering process (CSP). CSP uses a transient aqueous environment to effect densification by a mediated solution-precipitation process. These temperatures enable co-sintering of ceramic materials with other materials such as thermoplastics to develop unique composites and new functionalities in a single step process. The researchers have reduced the technology to practice using over 50 compositions, including advanced ceramics such as BaTiO3 and ZrO2, which are used extensively in electronic devices, among many other applications.

Application & Market Utility

The process shows promise for a diverse range of chemistries, crystal structures, and multimaterial applications. The properties of selected CSP samples have physical properties essentially equivalent to samples made by conventional thermal sintering. The technology provides a roadmap to guide future studies on ultra-low temperature ceramic sintering, ceramic materials integration, printable electronics, bulk ceramics, and sustainable manufacturing processes for electro-ceramics, mechanical components, and refractories.

Next Steps

Seeking research collaboration and licensing opportunities.

TECHNOLOGY READINESS LEVEL 4-7

Seeking

Investment | Licensing | Research

Keywords

- Binary Compounds
- Cold Sintering Process
- Dense Ceramics
- Thermodynamics
- U.S. Patent No. 10,730,803

Researchers

Clive A. Randall, Ph.D. Professor of Materials Science and Engineering Website

Originating College

College of Earth and Mineral Sciences

Office of Technology Management Contact

Smith, Matthew mds126@psu.edu 814-863-1122



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