



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 multi-material 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

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