

Methods of Making Ceramics Ductile

Flash sintering and high-temperature pre-loading methods create ductile ceramics at low temperatures, significantly expanding industrial application possibilities for components like thermal barrier coatings and fuel cells.

Most ceramics have very limited plasticity at low temperatures due to a lack of dislocations, which leads to brittle behavior at room temperature and limits potential applications. Researchers at Purdue University have developed two methods of making ceramics ductile at low to intermediate temperatures. The two methods namely, flash sintering and high-temperature pre-loading, introduce high density defects in the brittle ceramics which make the ceramics much more ductile at room temperature. Production of ceramics with ductile behavior at room temperature greatly expands the possible applications of ceramics in industry.

Advantages:

- Ductile behavior at low temperatures
- Sintering at lower temperature

Potential Applications:

- Thermal barrier coatings for high thrust engines
- Solid oxide fuel cells
- Shape memory devices

TRL: 4

Intellectual Property:

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