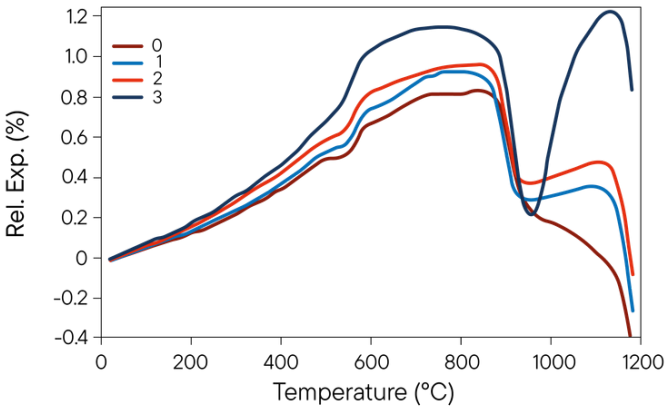
Thermal Expansion Behavior of Ca-Rich Ceramic Bodies

DIL L75 Horizontal Characterization of Sintering and Phase Formation

Thermal expansion measurements provide valuable insight into the dimensional stability and phase evolution of ceramic materials during firing. Understanding expansion and shrinkage behavior is essential for optimizing firing profiles and minimizing deformation in advanced ceramic products. In this study, a LINSEIS DIL L75 Horizontal was used to investigate the thermal expansion of Ca-rich ceramic bodies and evaluate the influence of mineralogical composition on sintering behavior.

Measurement Setup

- Instrument: LINSEIS DIL L75 Horizontal
- Material: Ca-Rich Ceramic Bodies
- Temperature Range: Room Temperature to 1200 °C
- Atmosphere: Helium and Air
- Heating Rate: 5 °C/min
- Measurement: Thermal Expansion
- Application: Ceramic Processing and Sintering



The dilatometry measurements clearly reveal the thermal expansion and sintering behavior of the investigated ceramic compositions.
Key observations include:

- Continuous expansion during heating
- Onset of sintering above approximately 850 °C
- Stable expansion region between 950 and 1160 °C
- Distinct behavior depending on mineral composition

The results demonstrate the suitability of dilatometry for optimizing ceramic firing processes.

Interpretation

The observed behavior can be attributed to:

- Phase formation during firing
- Temperature-dependent sintering
- Crystallization of stable minerals
- Material-specific expansion behavior

This results in:

- Improved dimensional stability
- Optimized firing conditions
- Reduced thermal deformation

Industrial Relevance

Dilatometry measurements support:

- Ceramic tile production
- Structural ceramics
- Historical ceramics research
- Firing process optimization
- Quality control
- Ceramic material development

Conclusion

The LINSEIS DIL L75 Horizontal enables precise characterization of thermal expansion and sintering behavior over a wide temperature range. The measurements provide valuable information for optimizing ceramic compositions and firing profiles, supporting the development of dimensionally stable ceramic products for industrial and architectural applications.

Source:
Dvořáková, P., Kloužková, A., Kohoutková, M., Kolářová, M.
Moisture Expansion of Ca-Rich Ceramic Body.
IOP Conference Series: Materials Science and Engineering, 2021.
Adapted from thermal expansion measurements performed using a LINSEIS DIL L75 Horizontal.