

# SEMINAR

Tuesday, 16.12.2025, 13:00, Kolar's Lecture Hall

## Playing with heating rates and sintering in YSZ

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Ultrafast high-temperature sintering (UHS) is currently emerging as a powerful tool for consolidating ceramics on a timescale of seconds to a few minutes. It employs graphite felts as resistive heating elements, which, due to their low thermal capacity, can be heated to ultrahigh temperatures in a matter of seconds.

Herein, we report the ultrafast high-temperature sintering of yttria-stabilized zirconia (YSZ). The results show that effective densification can be attained in a very short time scale and at temperatures significantly lower than those required for conventional sintering. Such an effect is attributed to the microstructural refinement induced by rapid heating when treating nanograined YSZ powders (particle size about 20 nm). Such a heating rate impact on densification can be detected even in conventional heating conditions. On the other hand, the heating rate impact on densification is reduced when considering green bodies obtained with coarser powders.

UHS can also be integrated with additive manufacturing techniques to produce small components with complex shapes. In particular, we show that fused filament fabricated YSZ gyroids can be debinded and sintered by UHS within one minute, obtaining bodies with properties analogous to those obtained by conventional firing.

## Kindly invited.