Contribution ID: **204** Type: **3. Oral presentation**

Sintering shrinkage behavior, microstructure evolution and property relationships in Gd2O3–MgO infrared transparent composite ceramics

Transparent Gd2O3–MgO composite ceramics are promising materials for mid-wave infrared (MWIR) window applications due to their good optical transparency and thermal stability. However, the sintering behaviour and microstructure evolution of the two-phase system are strongly influenced by the phase transition of Gd2O3 and the phase compatibility between Gd2O3 and MgO, which significantly affect the final properties of the ceramics. In this work, Gd2O3–MgO composite ceramics were fabricated using combustion-synthesized nanopowders followed by pre-sintering and hot isostatic pressing. The effects of phase volume ratio and Zr stabilization on sintering shrinkage behaviour, densification process and microstructure evolution were systematically investigated. Real-time shrinkage observations show that the undoped ceramics exhibit rapid shrinkage around 1250 ℃ due to the phase transition of Gd2O3, while Zr stabilization effectively suppresses this abrupt shrinkage and promotes a more stable densification behaviour. Microstructural characterization reveals that Zr segregates along the grain boundaries of the Gd2O3 phase, producing a grain boundary pinning effect that refines the microstructure and improves phase compatibility. Dense Gd2O3–MgO composite ceramics with optimized composition exhibit high transmittance of 78–86% in the 3–5 μm range, together with favourable thermal conductivity and mechanical properties.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

Yes

Author: Dr ZHANG, Buhao (Shanghai Institute of Ceramics, Chinese Academy of Sciences)

Co-authors: Prof. ZHANG, Jian (Shanghai Institute of Ceramics, Chinese Academy of Sciences); Prof. MAO, Xiaojian (Shanghai Institute of Ceramics, Chinese Academy of Sciences)

Presenter: Dr ZHANG, Buhao (Shanghai Institute of Ceramics, Chinese Academy of Sciences)

Session Classification: Sintering of specific material systems

Track Classification: Group 4: Sintering of specific material systems