Contribution ID: **77** Type: **3. Oral presentation**

A versatile binder system enabling co-debinding and sintering in multi-material vat photopolymerization

Vat photopolymerization (VPP) enables high-resolution additive manufacturing of ceramic components and offers significant potential for multi-material processing. A key challenge is the development of compatible binder systems that ensure defect-free debinding and subsequent sintering, particularly at material interfaces. In this work, a versatile binder system was developed and applied to ceramic slurries based on aluminum oxide (Al_2O_3), zirconium dioxide (ZrO_2), zirconia-toughened alumina (ZTA), alumina-toughened zirconia (ATZ), silicon dioxide (SiO_2), aluminum nitride (AlN), and titanium dioxide (TiO_2) with solid loadings between 45 and 56 vol-%, fulfilling VPP requirements regarding viscosity and curing behavior. Thermogravimetric analyses enabled the derivation of a unified debinding program suitable for all investigated materials. Following debinding, the components were successfully sintered under material-specific conditions, yielding dense, almost defect-free microstructures. Relative densities between 95 % and nearly 99 % were achieved. The sintering results demonstrate that the developed binder system enables reliable downstream processing and provides sufficient densification for an initial validation of the process chain. Overall, this work represents an important step toward robust multi-material VPP, forming a solid basis for future optimization of co-sintering strategies.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

Author: Ms LEHMANN, Chantal-Liv (wbk Institute of Production Science)

Co-authors: Prof. ZANGER, Frederik (wbk Institute of Production Science); Dr SCHUBERT, Johannes (wbk Institute of Production Science)

Presenter: Ms LEHMANN, Chantal-Liv (wbk Institute of Production Science)

Session Classification: Sintering for additive manufacturing

Track Classification: Group 4: Sintering for additive manufacturing