ABSTRACT - POSTER

VerAdMa project - Production of complex-shaped glass parts using additive manufacturing methods

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The Interreg FWVL VerAdMa project (Le VERre se vit en ADditive MAnufacturing) brings together academics, industry stakeholders, and research centres working in the field of glass. The main objective of the project is to promote the development of innovative additive approaches to glass manufacturing. The project is divided into two manufacturing routes: fusion and sintering.

The University of Mons is working on the sintering field. This research aims to produce parts with complex geometries from glass powder suspensions, cast in molds obtained by additive manufacturing. The research focuses on the formulation of suspensions and the characterization of structural evolution under sintering conditions of the cast materials.

Obtaining final parts with satisfactory optical and mechanical properties depends on the control of: (i) homogeneity and compactness of the green parts and (ii) densification during debinding and sintering. The impact of the following points will be assessed:

1. Powder particle size distribution.
2. Preparation of casting suspensions.
3. Glass composition.

The selected glass powders must meet standard soda-lime compositions to allow for the use of recycled powders. The composition can be modified by adding limited amounts of additives to modify the properties of the powders' surface. A so-called "composite" approach will also be studied. It will be based on the use of a mixture consisting of glass powder and a silica precursor, in the possible presence of precursors of other oxides. These precursors would have the potential to form a glass network at temperatures much lower than the temperature required for sintering glass powder alone.

The first stage of the project therefore aims to study different milling conditions for soda-lime glass. Different glass sources were used. Ring mills and the Turbula were studied. The powders were characterized by X-ray fluorescence, particle size analysis, X-ray diffraction, and dilatometry.