

ORAL PITCH AND POSTER - 1) PROCESSOS DE MANUFATURA ADITIVA DE
MATERIAIS CERÂMICOS (VAT-PHOTOPOLYMERIZATION, MATERIAL
EXTRUSION, BINDER JETTING, HYBRID...)

CO2-LASER BASED 3D PRINTING USING GLASS FILAMENTS

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Until recently, transparent glass was considered the last frontier within the additive manufacturing (AM) industry, however a number of different solutions has emerged lately. In the presentation, the implementation of a novel AM technique, Direct Glass Laser Deposition (DGLD™), using our in-house built tabletop 3D printer, will be discussed.

The standard feedstock used today is fused silica filaments with a diameter of 200 µm, which offers a compromise between print resolution, print accuracy, as well as deposition rate. By focused multiple-beam irradiation, using a CO2-laser, a small hot-zone of ~300 µm in diameter is formed, making it possible to 3D print high quality transparent glass objects; ranging from microlens arrays to larger and more complex geometries. The tight focus reduces the laser power required to reach temperatures in excess of 2000°C, resulting in a printer with a max rated power consumption of < 500 W. This compact and energy efficient solution

enables lower operation costs with a reduced overall carbon footprint during the printing process, directly aligning with numerous Sustainable Development Goals. The aim of current and future research is to combine the filament-based DGLD™ 3D printing method with a variety of different types of glass used as feedstock, in order to fabricate advanced components tailored for diverse applications, ranging from glass for photonics to bioactive glass, as well as glass-ceramics. The presentation will summarize the development, capabilities and future potential of direct glass 3D printing.

Palavras-chave: fused silica glass; 3d printing; direct glass laser deposition.