Title: “Volumetric 3D printing of high performance ceramics “

Abstract:

Ceramic materials have numerous industrial applications thanks to their high chemical, mechanical, and thermal resistances. Precisely because of these reasons, producing parts with these materials is technically challenging with conventional subtractive manufacturing methods. Additive manufacturing is a promising alternative to fabricate ceramic parts with complex geometries. For example, pre-ceramic polymer resins are used in commercial light based Stereolithography printers (e.g https://www.lithoz.com/).
We developed a volumetric printing technique that solidifies all layers simultaneously instead of the traditional layer by layer deposition. This opens us new avenues to print complex geometries without support structures. In particular, we applied volumetric printing to the fabrication of ceramic parts. During the talk, we will review recent Volumetric additive Manufacturing (VAM) methods and in particular describe the working principle of VAM by tomographic backprojection.
We will show examples of fabricated complex centimeter scale Silicon Oxycarbide ceramics with excellent performance in terms of heat and chemical resistance.

Short bio:

Christophe Moser is Associate Professor of Optics and Section Director in the Institute of Electrical and Microengineering at EPFL. He obtained his PhD at the California Institute of Technology in optical information processing in 2000. He co-founded and was the CEO of Ondax Inc (acquired by Coherent Inc.), Monrovia California for 10 years before joining EPFL in 2010. His current interests are ultra-compact endoscopic optical imaging through multimode fibers, retinal imaging, volumetric additive manufacturing with light. He is also the co-founder of Composyt light lab in the field of head worn displays in 2014 (acquired by Intel Corp), Earlysight in 2019 , Readily3D in 2020 and Modendo Inc in 2021. He is the author and co-author of over 90 peer reviewed publications and over 50 patents.