

Volumetric Bioprinting: a new tool for producing artificial tissue models



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Abstract:

3D printing has revolutionized the manufacturing of volumetric components and structures in many areas. Several fully volumetric light-based techniques have been recently developed thanks to the advent of photocurable resins, promising to reach unprecedented short print time (down to a few tens of seconds) while keeping a good resolution (around 100 microns). However, these new approaches only work with homogeneous and relatively transparent resins so that the light patterns used for photo-polymerization are not scrambled along with their propagation. We will illustrate a method that considers light scattering in the resin prior to computing projection patterns. Light scattering in resins having a high cell density (> 4 million cells /mL) is severe and we will show that scattering correction method allows to print high-resolution structures.

We will show several examples of complex 3D tissue models including bone, liver and a pancreatic cancer tissue. This scattering correction extends the capabilities of conventional light-based volumetric printing which opens up promising perspectives for bioprinting cell-laden constructs.

Biography:

Christophe Moser is Full Professor of Optics in the department of Electric and MicroEngineering (IEM) 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 (now Coherent Inc.), Monrovia California for 10 years before joining EPFL in 2010. His interests are Volumetric 3D printing, ultra compact endoscopy through multimode fibers, retinal imaging and optical computing. He co-founded Composyt light lab in the field of head worn displays in 2014 (acquired by Intel Corporation in 2015). He is the co-founder or EarlySight SA (2019), Readily3D SA (2020) and Modendo (2021). He is a fellow of the European Optica Society. He is the author and co-author of over 100 peer reviewed publications and over 60 patents.