3D Printing Strategies for Rapid Generation of Cellular Microenvironments

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Higher resolution 3D printers based on multiphoton lithography, which can achieve smaller feature sizes, have the potential to open new avenues for bio-applications, such as tissue engineering or microphysiological systems. However, to be broadly implemented, these high throughput and versatile fabrication strategies need to be validated in a biological context. Cyto- and phototoxicity of 2-photon photoinitiators is also a critical point to ensure widespread adoption in the field. In this talk, UpNano GmbH will present their NanoOne 3D printing system and discuss current biofabrication applications and how photoinitiator toxicity is addressed. They will explore cellular interaction with various hydrogel matrices and discuss cellular invasion and co-culture systems.[1] The company will highlight several recent examples where the machine has been used to extend what is currently achievable in high-resolution manufacturing. The NanoOne is unique from other commercial 2PP systems because of the significantly higher speed, piezo precision stage and mesoscale build volume. This talk will feature recent work in bioprinting whereby 2PP was used to generate microvascular structures directly on-chip[2]. Advances in using photodegradable hydrogels to enable 2PP-based subtractive manufacturing will also be summarized[3] and their role in rapid spatiotemporal biofabrication and drug delivery will be discussed.

References:

[1] Dobos, A.; et al. *Adv. Healthcare Mater.* **9**, *15*, 1900752.
[2] Dobos, A.; et al. *Biofabrication* **13**, *1*, 015016.
[3] .Qiu, W.; ; et al. *Angew. Chem. Int. Ed.* **63**, *45*, e202404599.