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ENGINEERING
MOLECULAR SYSTEMS

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- In Person -

FELIX LÖFFLER will talk about **NANO 3D PRINTING FOR HIHG-THROUGHPUT SYNTHESIS AND SCREENING** in the “Engineering Molecular Systems” colloquium on **June 19th 2023** at **5 p.m.** (CET) hosted by the Flagship Initiative Engineering Molecular Systems of Heidelberg University. The colloquium will take place at the BioQuant (Im Neuenheimer Feld 267 room SR041).

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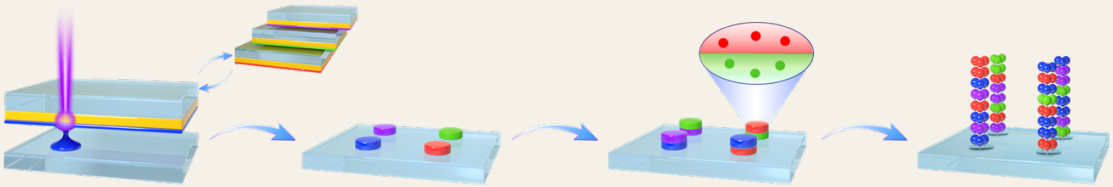
ABSTRACT:

The screening of large and diverse chemical or material libraries promises the discovery of new biomedical compounds or catalysts. However, the lack of flexible and cost-effective synthesis technologies for complex compound libraries hinders many research applications. By using solid polymers instead of liquid solvents as a medium for delivery of chemicals and reaction control, we can rapidly synthesize large libraries of diverse biomolecules and nanomaterials.

Unlike liquid solvents, many polymers are solid and stable at room temperature and they can be triggered by heating above their glass transition temperature. This initiates diffusion within the polymer while maintaining its pattern and shape, allowing well-controlled parallel reactions in polymer reactors.

With our laser-based polymer patterning technologies [1–3], we can synthesize biomolecules in parallel, such as peptides for vaccine development [4]. In combination with our novel vapor-based synthesis approach [5], other reactions, such as chemical glycosylation, can be explored in parallel. Recently, we have developed a high-speed approach for printing and driving chemical reactions simultaneously with the laser [2]. This allows us to synthesize libraries of defined nanoparticles and other materials in milliseconds for high-throughput materials identification [6, 7]. In addition, we are currently working to revolutionize the axial resolution of nano 3d printing for device and sensor fabrication [8].



References

[1] Loeffler et al., *Nat. Commun.* 2016, 7, 11844
[2] Zhang et al., *Adv. Mater.* 2022, 34, 2108493
[3] Paris et al., *Adv. Mater.* 2022, 34, 2200359
[4] Fathi et al., *Nat. Commun.* 2022, 13, 4182
[5] Tsouka et al., *J. Am. Chem. Soc.* 2022, 144, 19832–19837
[6] Zhang et al., *Nat. Commun.* 2021, 12, 3224
[7] Zhang et al., *Nat. Nanotechnol.*, *accepted*
[8] Ronneberger et al., *in preparation*

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BRIEF CV:

Felix Loeffler studied physics and biophysics and received his doctorate in physics and biochemistry from the University of Heidelberg and the German Cancer Research Center. He was a postdoctoral researcher at the Karlsruhe Institute of Technology (KIT) and UC Berkeley in the fields of engineering, infectious disease research, and biochemistry. Since 2017, he leads a multidisciplinary BMBF NanoMatFutur group at the Max Planck Institute of Colloids and Interfaces in Potsdam. His research focuses on nanoprinting, nanomaterials, and biosensors, as well as chemical and material synthesis technologies, with applications in high-throughput synthesis and screening.