

**ICB PhD public presentations****ADVANCES IN DNA-BASED  
FUNCTIONAL MATERIALS AND  
PERFORMANCE IMPROVEMENTS  
OF SOFT PUMPS****Xavier Kohll**

ICB / Functional Materials Laboratory  
Supervisor: Prof. Dr. Wendelin Stark  
Co-examiner: Prof. Dr. Mirko Meboldt



**ETH Hönggerberg, 07/08/2019**  
**HCI J 143, 13.00 h**

**Project Summary:** DNA is the information carrier of all known lifeforms and is a useful tool to develop new technologies in many different fields. Due to the unprecedented growth of digital information, DNA is considered a viable solution for long-term digital data storage. However, digital data storage in DNA is only valuable when DNA can be protected from degradation. Part of this work presents a simple and high density salt-based DNA storage system that limits DNA from degradation. The storage system was tested by storing a DNA pool encoding 115 kB and decoding it via Illumina sequencing.

DNA encapsulated in silica, can be used as a DNA barcode to track and trace products. We demonstrated the use of DNA barcodes to quantify the composition ratio of two-component systems to ensure correct mixing.

Heart failure affects more than 26 million people worldwide. A potential solution for these patients are soft total artificial hearts (sTAH). However, sTAH currently lack a sufficient performance and lifetime. Here, we present an alternative manufacturing technique for sTAH, which enabled long-term operation of up to 1 million actuation cycles.

CV. Xavier received his BSc in Chemical Engineering and MSc in Chemical- and Bioengineering from ETH Zurich in 2014 and 2015. After an internship at Accenture, he started his doctoral studies in the Functional Materials Laboratory in April 2016.