

ICB PhD public presentations

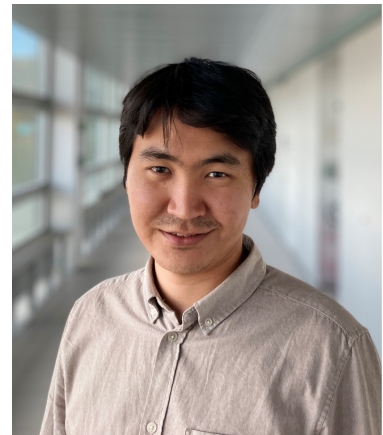
DEVELOPMENT OF A SOFT TOTAL ARTIFICIAL HEART USING INJECTION MOLDING AND EVALUATION OF FDM 3D PRINTING FOR MOLD PRODUCTION

Damir Temiraliuly

ICB/Functional Materials Laboratory

Supervisor: Prof. Dr. Wendelin Stark

Co-examinors: Prof. Dr. Roger Gassert, Dipl.Ing.,
Dr.rer.medic. Friedrich Kaufmann (Deutsches Herz-
zentrum der Charité), Prof. Dr. Kunal Masania (TU Delft)



08/01/2025, 10:00 am

ETH Hönggerberg, HCI D 8 and on Zoom
(<https://ethz.zoom.us/j/63735693400>)

Project Summary: Heart failure is the world's leading cause of death with a prevalence of around 26 million people worldwide. One of the potential treatments for patients with advanced stage of this disease is a mechanical circulatory support device such as the soft total artificial heart (sTAH). Currently, the sTAH faces challenges related to performance and durability, particularly in its operational lifespan. With the aim of improving the fatigue life of the sTAH, injection molding (IM) was considered as the manufacturing method with complex mold design and the sTAH was characterised in vitro using a custom-built mock circulatory loop.

IM is a well-established manufacturing method with highly scalable and repeatable high-tolerance production. While IM is efficient for mass production, it is not considered practical for low-volume or resource-limited applications due to the arduous and costly process of mold making and long lead-time. To address this, the study also evaluates the potential of FDM 3D printers for IM mold fabrication.

CV. Damir obtained his BSc in Robotics and Mechatronics from Nazarbayev University in Kazakhstan before coming to ETH Zurich in 2017 for his MSc in Robotics, Systems and Control. In 2021 he joined the Functional Materials Laboratory to pursue his doctoral studies.