

Final Report

Project acronym: *4dBloodROT*

Project number: 5086

M-ERA.NET Call 2017

Period covered: 01/10/2018 to 31/03/2022

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2. Publishable project summary

Focus on methodology, results and conclusions (max. 1 page).

Please note: The publishable summary will be used for dissemination by M-ERA.NET and the EC.

Rotor demonstrators for cardiological blood pumps and of implants for ventricular assist devices for short-term and medium-term application were designed and manufactured by the additive



manufacturing method stereolithography. The optimization of the rotors was supported by finite element based mechanical and fluid dynamic simulations.

Biocompatible thiol-yne based photopolymer resins were developed, reinforcement with carbon nanotubes as filler material even increases the bioactivity, but negatively affects the mechanical properties. However, the resin system is interesting for a number of medical applications requiring complex (patient-specific) shape, high bioactivity and low cytotoxicity.

A demonstrator projection system for stereolithography printing, potentially interesting for commercial applications in the field of larger printing systems and components, was developed.

Titanium nitride and amorphous silicon oxide hydrogen coating systems reduce cytotoxicity and improve hemocompatibility of the investigated samples and demonstrators.

The functionality of the developed rotor demonstrators was tested on a laboratory scale with respect to blood compatibility (blood flow, hemolysis, thrombogenicity). First tests were promising and will be continued after the end of the project.