Studien-/Masterarbeit

Design, development and validation of a fluidic chamber for the analysis of diffusion utilizing RAMAN microscopy

Fachrichtung Maschinenbau/Verfahrenstechnik/Nanotechnologie

Kurzbeschreibung:

Cryopreservation is a critical method for the efficient and long-term storage of clinically relevant cells, tissue-engineered (TE) constructs, and native tissues. During cryopreservation, cryoprotective agents (CPAs) are used to protect cells and tissues from low-temperature-induced damage, primarily caused by ice crystal formation. Optimized cryopreservation protocols rely on precise incubation times of CPAs, which are determined by the diffusion rates of these CPAs into the tissue. Therefore, understanding the diffusion coefficients of CPAs under different temperatures and dynamic conditions is vital for developing effective cryopreservation strategies.

The aim of this work is to develop and validate a fluidic chamber for analyzing diffusion using RAMAN microscopy. The following prerequisites must be met for the development of the diffusion chamber:

1) Consideration of the geometry of the 1 ml cell suspension sample

2) adaptation of the chamber size to the available free space under the RAMAN microscope

3) dynamic perfusion of the chamber with CPAS or CPA mixtures

4) temperature working range from -30°C to 25°C

5) leak-proof tightness to prevent spillage or contamination during experiments

The parts of the diffusion chamber are to be developed using the SOLIDWORKS design software and manufactured in the institute's mechanical workshop. The validation of the chamber is to be carried out first based on the fulfillment of the above-mentioned prerequisites. The next step is to investigate whether the measurement of CPA diffusion into cell suspension under RAMAN microscopy works properly.

Art der Arbeit:
Experimentell/theoretisch

Beginn: Ab sofort

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Bist du interessiert? Hast du Fragen zum genauen Ablauf und Umfang der Arbeit? Melde dich und vereinbare einen Termin für ein unverbindliches Gespräch!