INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	**UNC Charlotte – ME BioMedical**	**Date Submitted**	*07/27/2023*
Project Title	**Vitrification and rewarming organoids**	**Planned Starting Semester**	*Fall 2023*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	**Number**	**Discipline**	**Number**
Mechanical	4	Electrical	
Computer		Systems	
Other ( )			

Company and Project Overview:

Making available large quantities of primary human cells on demand for cell therapy and regenerative medicine can have a profound impact in treating acute and metabolic liver diseases. Currently no technology exists that can provide this service. The goal of this project is to modify an earlier device and build a new device for both controlled vitrification and rapid rewarming of up to 50ml of organoids.

Project Requirements:

Modify a current device to control the thermal length/thickness of the container during cooling of the organoids to ensure vitrification. Cooling rates should remain > 5°C/min. Build a new device to rapidly rewarm the vitrified organoids with warming rates > 50-100°C/min to prevent any ice crystal formation during rewarming. These devices should be able to produce 50ml of organoids.

This is a more detailed description of the design problem, project objectives and the desired output – describing the scope and specifications for what the project team will actually be designing and producing.

Expected Deliverables/Results:

- Device to cool 50 ml of organoids at rates > 5°C/min while reducing the thermal length during the cooling phase.
- Final thermal length should be such that the warming device can rewarm at rates > 50-100°C/min.
- Monitor temperature of system and product during the processes
- Computer control cooling and warming processes.

Bullet list of all deliverables that the team is to provide to the supporter at the end of the project. Be specific here to avoid misunderstandings.

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the Industry Supporter. Typically, the work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date. Please confirm your expectation in this section.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- To build device that can withstand cryogenic temperatures
- To monitor temperature of system and product
- Computer control of cooling and warming processes