

Progress Report 6: March 9 to March 15, 2007

MALDI-MSI Tissue Coating Device

Client: Dr. Amy Harms, Ph.D., Biotechnology Center

Advisor: Professor Brenda Ogle, Biomedical Engineering

Team Members: Laura Piechura (Leader)

Kellen Sheedy (Communicator)

Holly Liske (BWIG)

Jenna Spaeth (BSAC)

Problem Statement

Matrix-assisted laser desorption/ionization mass spectrometric imaging (MALDI-MSI) is an imaging method that allows for label-free spatial analysis of biological tissue samples. This technology can be used to identify and quantify proteins, monitor protein biomarkers, and sequence polypeptide chains, techniques that can be applied to proteomic analysis of disease formation. However, sample preparation methods, especially with regard to the application of the matrix tissue coating, are difficult to control but require accuracy and precision. A device must be developed to apply a fine, uniform coating of light-absorbing compounds in order to simplify the sample preparation process. The goal is to provide a reliable tool to enhance the MALDI-MSI technique in order to speed and simplify potentially life-saving research.

Last Week's Goals

- After many group meetings and much time spent assembling the midsemester Powerpoint, we hope to give an effective presentation detailing our work thus far for the other groups and our advisors on Friday, March 9.
- After the presentation, we will divide the components of the midsemester paper between the group members and set a date for assembling the rough draft. After editing, this paper will be submitted for grading on Wednesday, March 14, along with the Peer and Group Evaluations and our design notebooks.
- With the decisions made thus far, we will submit a list of parts to order to our client. If the parts should arrive within the week, we will begin assembly of our prototype.

Summary of Accomplishments

- On Friday, March 9, we delivered a presentation to an audience consisting of Dr. Chesler, Dr. Ogle, and their design teams. After the presentation, we held a short team meeting during which we decided that each team member would write the section of the midsemester report corresponding to the portion of the presentation that they spoke about. Specifically, Laura wrote the Abstract, Problem Statement, Introduction, Existing Products, Ethical Considerations, and Conclusion sections of the paper. Kellen detailed the future work and design specifications, Jenna authored sections concerning the design alternatives as well as design matrix, and Holly described the final design. These separate sections were to be sent to Laura by Tuesday morning, and she then assembled the completed paper, which was turned in to Professor Ogle on Wednesday, March 14, along with our design notebooks.
- On Wednesday, March 14, we held a group meeting to finalize the parts we'd like to ask our client to order. While we would like more information on the Paasche© A-AU automatic air gun, which Kellen will attempt to obtain from Mark, the representative she has been speaking with, we decided it will best fulfill our design specifications and we will request that our client order it. In addition, we have decided to purchase a flat spray nozzle, compatible with the A-AU gun, the 12 VDC, 60 rpm motor from MPJA, Inc., the corresponding power adaptor, and a sheet (1 square meter) of clear low density polyethylene. We hope to begin assembly of these materials prior to

the spring break recess, and with them, determine the remaining parts that need to be ordered, like the small parts and belts for the conveyor system.

- In addition, Kellen contacted our client and established a meeting at 12:05 on Friday, March 16, during which we will present her the parts that we'd like ordered, as well as questions we've amassed since the last client meeting.

The Week's Goals

- We will meet with our client on Friday, March 16, to ask her to place an order for the parts we've decided to utilize in our final design.
- After many group meetings and much time spent assembling the midsemester Powerpoint, we hope to give an effective presentation detailing our work thus far for the other groups and our advisors on Friday, March 9.
- After the presentation, we will divide the components of the midsemester paper between the group members and set a date for assembling the rough draft. After editing, this paper will be submitted for grading on Wednesday, March 14, along with the Peer and Group Evaluations and our design notebooks.
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Project Difficulties

Upon realizing that the DC motor we've chosen for our final design may create a spark as turns, we now have concerns about a possible interaction with the chemicals of the matrix. However, after speaking with Dr. Gruben, we think a new design that separates the motor from the matrix, and some initial testing should solve the problem

Activities

Team Member	Activities	Time for Week	Total Time
Holly	Research of motor and conveyor assembly, team meeting, midsemester report	7 hours	43.5 hours
Jenna	Research of spray nozzle pressure-valve system and plastic, team meeting, assembly of report	7 hours	43 hours
Kellen	Research of spray gun mechanism, team meeting, assembly of report	7 hours	43 hours
Laura	Research of airbrush, plastic, team meeting, assembly of report, Progress Report 7	10 hours	45.5 hours

Project Timeline

	2/2	2/9	2/16	2/23	3/2	3/9	3/16	3/23	3/30	4/6	4/13	4/20	4/27	5/4	5/9	5/11
Client Meeting	△															
Research Project	△	◆														
Write PDS		△														
Brainstorm Design Ideas		△		◆												
Choose 3 Designs to Enhance					△											
Chose 1 Design to Pursue					△											
Work on Midsemester Presentation					△	◆										
Work on Midsemester Paper					△	◆										
Finalize Design						△										
Order Materials							△									
Build and Test Prototype								△					◆			
Work on Poster Presentation												△		◆		
Work on Written Report													△			
Final Meeting with Advisor																△

*Red coloring denotes a completed task.