

Title: Microencapsulation of tissues and cells for treatment of hormone-related diseases.
(microencapsulation), Project #4

Client: Dr. Craig Atwood (GRECC 11G, VA Hospital)

Faculty Advisor: Professor William Murphy (2154 ECB)

Team Albert Kwansa, Team Leader

Members: John Harrison, Team Communicator

Yik Ning Wong (Jacqueline), Biomedical Student Advisory Committee (BSAC) Representative

Eric Lee, Biomedical Web Implementation Group (BWIG) Representative

Project Webpage: http://homepages.cae.wisc.edu/~bme200/microencapsulation_f06.

Dates: 11/20/06 – 12/3/06, Weeks 12 & 13 (Progress Report #11)

Project Design Statement: To design polyethylene glycol diacrylate (PEG-dA) hydrogels for the encapsulation of Murine Leydig Tumor Cells in an effort to increase cell viability and testosterone secretion. The PEGDA hydrogels must provide immunoprotection and allow for the effective diffusion of oxygen, nutrients, hormones, and metabolic wastes. The overall goal is to restore the testosterone level of castrated mice via injection or implantation of the PEG-dA encapsulated cells.

Restatement of Previous Team Goals:

1. Pick up PEGdA product from weekend diacrylation reaction either on Wed, 11/22/06 or Mon, 11/27/06 from Dr. Kao's Lab.
2. Obtain photoinitiator and begin fabrication of non-cell seeded PEGdA gels.

Summary of Team Accomplishments:

1. Performed multiple diacrylations on 10g PEG batches and have now set up to freeze dry the precipitated/filtered PEGdA samples → Will reattempt gelation on Monday and Tuesday.
2. Have been performing research for complete rationalization of experimental parameters including gel thickness [oxygen diffusion], UV photopolymerization time [effects on cells and PEGdA matrix], and adhesion peptide concentration.

Current Individual Goals:

- Albert Kwansa [Team Leader]:
Work on 11th progress report due Sunday, 12/3/06 by 5pm.
UV exposure on the PEGdA matrix.
- John Harrison [Team Communicator]:
Adhesion peptide concentration for parameter rationalization.
- Yik Ning Wong (Jacqueline) [BSAC Representative]:
UV exposure on cells
- Eric Lee [BWIG Representative]:
Oxygen diffusion in PEGdA matrix → Diffusion parameters.

Summary of Current Team Goals:

1. Perform Cell Titer-Blue Cell Viability Assay on cells to be obtained on 12/4/06 and evaluate the effects of exposure time to 365 nm UV light.
2. Complete lyophilization of PEGdA samples and perform photopolymerization [initially to observe whether they are any further complications with gelation].

3. Continue research on experimental parameter rationalization and use this research in conjunction with UV-cell experimental results to propose an optimized design for the process of developing PEGdA 12000 gels for encapsulation.
4. Continue to develop presentation for final poster session and writing of the final report.

Fall Semester Schedule:

| Week | Day | Date | Activities | Goals (From BME Schedule) |
|------|-----|-------|--|--|
| 1 | M | 9/4 | Labor Day | |
| | T | 9/5 | | |
| | W | 9/6 | | |
| | R | 9/7 | | |
| | F | 9/8 | | |
| | | | Take team photo. General research of project topic. Review past reports and presentations. | [Form teams. Select project. Contact client. E-mail team roles to advisor.] |
| 2 | M | 9/11 | Team meeting-1 on Mon, 9/11 at 11 am in ECB. (Develop list of questions for first client meeting) | [Literature search. Meet w/Client.] |
| | T | 9/12 | | |
| | W | 9/13 | | |
| | R | 9/14 | | |
| | F | 9/15 | Client meeting-1 on Fri, 9/15 at 12:00 pm in GRECC, VA Hospital. | |
| 3 | M | 9/18 | Advisor meeting-1 on Mon, 9/18 at 4 pm near 2154 ECB. | [Develop understanding of project. Develop PDS.] |
| | T | 9/19 | | |
| | W | 9/20 | | |
| | R | 9/21 | Team meeting-2 on Thurs, 9/21 at 7:00 pm in ECB. | |
| | F | 9/22 | | |
| 4 | M | 9/25 | Team meeting-3 on Mon, 9/25 at 2:30 pm in ECB. Advisor meeting-2 on Mon, 9/25 at 3:30 pm near 2154 ECB. | [Brainstorm] |
| | T | 9/26 | Team meeting-4 on Tues, 9/26 at 8:15 pm in ECB. | |
| | W | 9/27 | | |
| | R | 9/28 | | |
| | F | 9/29 | Advisor meeting-3 on Fri, 9/29 at 1:00 pm near 2154 ECB. (Evaluate current direction) | |
| 5 | M | 10/2 | Team meeting-5 on Mon, 10/2 at 2:30 pm in ECB. Advisor meeting-4 on Mon, 10/2 at 3:30 pm near 2154 ECB. | [Design Alternatives] |
| | T | 10/3 | | |
| | W | 10/4 | | |
| | R | 10/5 | | |
| | F | 10/6 | Team meeting-6 on Sun, 10/8 at 7:00 pm in ECB. | |
| 6 | M | 10/9 | Advisor meeting-5 on Mon, 10/9 at 3:30 pm near 2154 ECB. | [Work on Mid-Semester Presentation & Report] |
| | T | 10/10 | | |
| | W | 10/11 | | |
| | R | 10/12 | | |
| | F | 10/13 | Lecture: [Oral Presentation Guidelines, Peer Review of Report Drafts] | |
| 7 | M | 10/16 | Team meeting-7 on Mon, 10/16 at 2:30 pm in ECB. Advisor meeting-6 on Mon, 10/16 at 3:30 pm near 2154 ECB. | Work on Mid-Semester Presentation |
| | T | 10/17 | | |
| | W | 10/18 | | |
| | R | 10/19 | | |
| | F | 10/20 | Team meeting-8 on Fri, 10/20 at 12:00 pm in ECB. | |
| 8 | M | 10/23 | Team meeting-9 on Mon, 10/23 at 3:20 pm in ECB. Advisor meeting-7 on Mon, 10/23 at 3:30 pm near 2154 ECB. | [Decide on Final Design] |
| | T | 10/24 | Team presentation development in CAE at 5:30 pm. | |

BME 400-BME Capstone Design

Date: 12/3/06

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|----|---|-------|--|---------------------------|
| | W | 10/25 | Team presentation development in ECB at 5:45 pm. | |
| | R | 10/26 | Team presentation practice at 9:30 pm in room 1047 ECB (reserved through Student Leadership Center). | |
| | F | 10/27 | [MID-SEMESTER PRESENTATIONS] *NEW (BME 400 Only) [Design Notebooks Due to Advisor] **NEW | |
| 9 | M | 10/30 | Team meeting-10 on Mon, 10/30 at 2:30 pm in ECB. Advisor meeting-8 on Mon, 10/30 at 3:30 pm near 2154 ECB. | [Work on Design] |
| | T | 10/31 | | |
| | W | 11/1 | | |
| | R | 11/2 | | |
| | F | 11/3 | Team meeting-11 on Fri, 11/3 at 12:00 pm in ECB. | |
| 10 | M | 11/6 | Team meeting-12 on Mon, 11/6 at 2:30 pm in ECB. Advisor meeting-9 on Mon, 11/6 at 3:30 pm near 2154 ECB. | [Work on Design] |
| | T | 11/7 | | |
| | W | 11/8 | | |
| | R | 11/9 | | |
| | F | 11/10 | Lecture: [Machine Shop required lecture] Team meeting-13 on Sat, 11/11 at 4:30 pm in ECB. | |
| 11 | M | 11/13 | Meeting w/Amy on Mon, 11/13 at 12 pm at Rennebohm Hall. Advisor meeting-10 on Mon, 11/13 at 3:30 pm near 2154 ECB. | [Work on Design] |
| | T | 11/14 | | |
| | W | 11/15 | | |
| | R | 11/16 | | |
| | F | 11/17 | Diacrylation of PEG from 11/17 – 11/19 at Rennebohm Hall primarily carried out by Amy (Graduate Student from Dr. Kao's Lab). | |
| 12 | M | 11/20 | Advisor meeting-11 on Mon, 11/20 at 3:30 pm near 2154 ECB. | [Work on Design] |
| | T | 11/21 | | |
| | W | 11/22 | | |
| | R | 11/23 | | |
| | F | 11/24 | THANKSGIVING | |
| 13 | M | 11/27 | | [Work on Design] |
| | T | 11/28 | | |
| | W | 11/29 | | |
| | R | 11/30 | | |
| | F | 12/1 | | |
| 14 | M | 12/4 | | [Work on Presentation] |
| | T | 12/5 | | |
| | W | 12/6 | | |
| | R | 12/7 | | |
| | F | 12/8 | [FINAL POSTER PRESENTATIONS] | |
| 15 | M | 12/11 | | [Final Meeting w/Advisor] |
| | T | 12/12 | | |
| | W | 12/13 | [Final Report & Design Notebooks Due to Advisor] | |
| | R | 12/14 | | |
| | F | 12/15 | | |