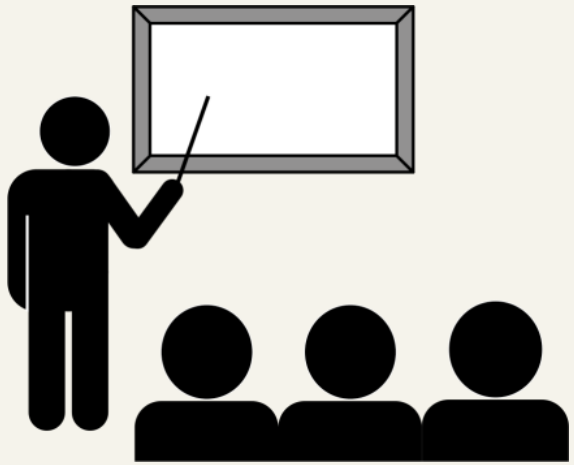
Lessons Learned By Designing and Instructing An Undergraduate Chemistry Course

13th Annual Graduate Research Symposium



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Yat Li Lab

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05/2017

Acknowledgement

Chem 179 – Nanomaterials for Energy Storage Devices (Spring 2015)

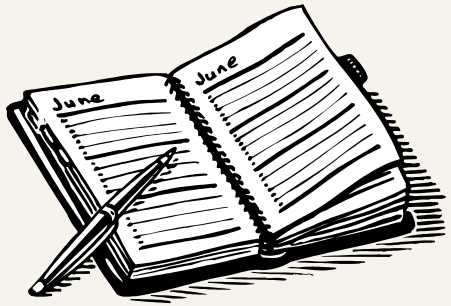
Funded by

Chancellor's Graduate Teaching Fellows

Scholarship, UCSC

Outline

- **Overview of the Course Design (~5 min)**
- **Lessons Learned (~5 min)**



Course Design

Class Overview

- **Class size**
  - 8 students (junior and senior undergraduates)

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  - One lecture per week
  - Before each week's lab sections
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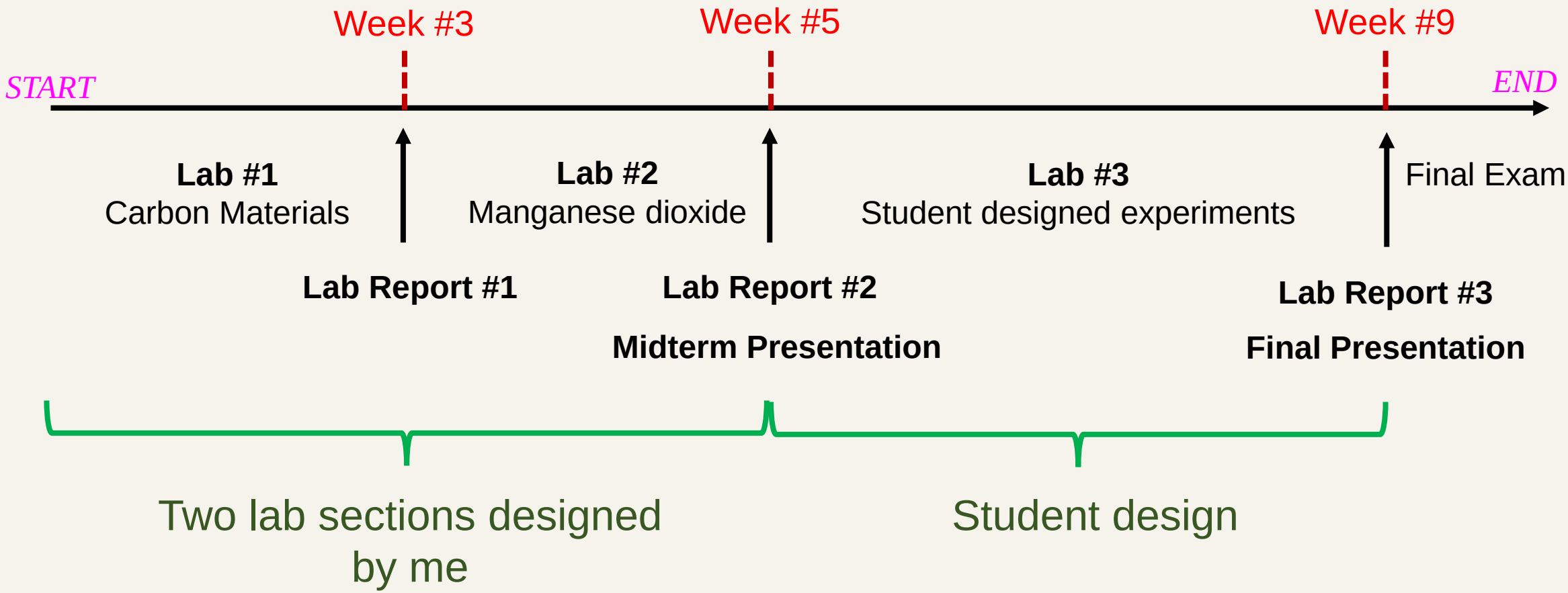
- **eCommons:** Grades/Slides/Papers/Announcements *etc.*

Class Schedule



Course Evaluation

- **Lab Reports (65% total)**
  - Scientific writing style
  - Three lab reports in total (two regular + one final)

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Title + Author Info — **Part 1**

Background/Introduction

Summary of experimental methods and mechanism — **Part 2**

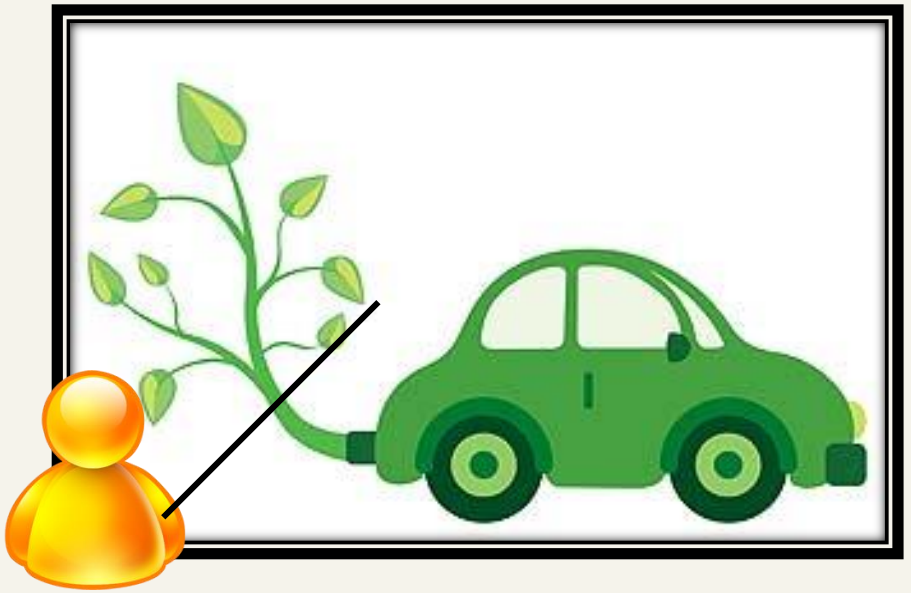
Data

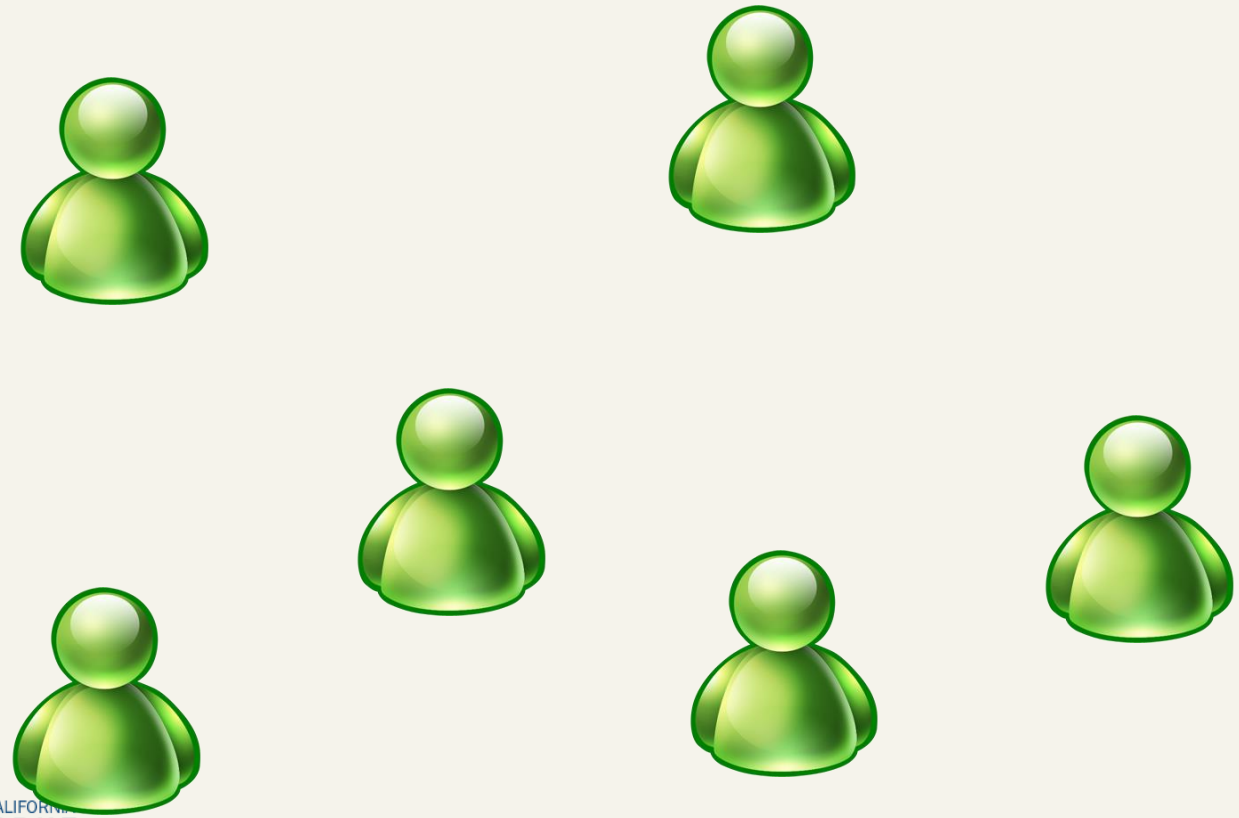
Analysis and Discussion (address questions) — **Part 3**

Conclusion — **Part 4**

Course Evaluation

- **Presentations (20% total)**
  - Peer-review





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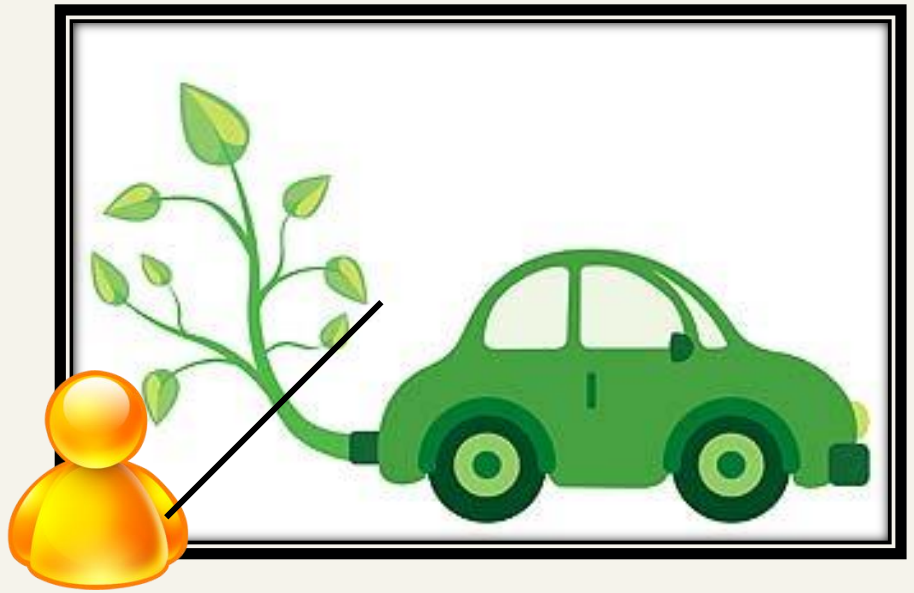

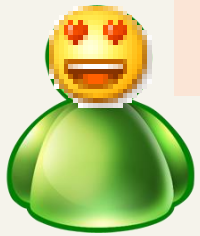
9.5/10


8.5/10

7.5/10


9/10


8/10


0/10

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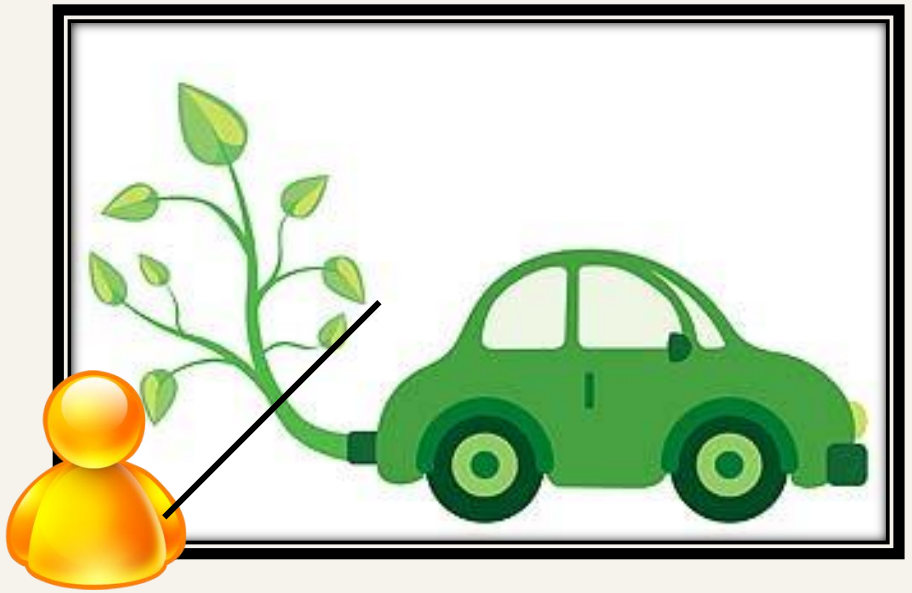

8.5/10

7.5/10

8/10

9/10

Average Score

8.3/10

Course Evaluation

- **Presentations (20% total)**
  - Peer-review
    - Course Instructor (me)
    - Invited Graduate Students ("Experts" and "Non-experts")
    - Course Advisor
    - Fellow Students

(Equal Weight)

Course Evaluation

- **Presentations (20% total)**
  - Evaluation Criteria

For the instructor and students

Background	Clearly introduced supercapacitors? ___/2
Motivation	Clearly state the motivation of their work? What is//are the goal(s) of their work? ____/5
Synthesis	Clearly present a synthesis route? (*e.g.* flow chart) ___/2
Data Analysis	SEM data and analysis ___/2
	CV data and analysis ___/4
	CP data and analysis ___/4
	EIS data and analysis ___/2
	Use of any papers to support their arguments? ___/2
Summary	A clear summary/conclusion? ___/1
	Proposed some reasonable future work(s) that can enhance the performance? ___/1

Total Score: _____/25

Course Evaluation

- **Presentations (20% total)**
  - Evaluation Criteria

For the invited non-experts

1. Do you ***understand*** most of their presentation?
2. Did they provide a ***clear background*** about supercapacitors?
3. Did they present a clear and solid ***motivation/goal*** for their work?
4. Did they ***clearly analyze*** their data with some scientific papers cited to support their arguments?
5. Do you think they were ***confident*** when answering questions and they successfully addressed most of the questions asked by others?
6. In all, do you think their presentation is ***well-organized***?

Course Evaluation

- **Lab Effectiveness (5%)**
  - Active participation?
  - Safety?
- **Take-home Final Exam (10%)**
  - Comprehensive understanding
  - Based on recently-published papers (challenging but approachable)
  - Instructor available for answering questions

Lesson Learned

(based on students' feedback)

Feedback #1

- Battery-type materials were only briefly touched upon and I would have liked to learn a bit more. Also the grading method for the presentations can be improved as fellow classmates can conspire to give other groups poor grades. The instructor's grade should greatly outweigh the grades given by other classmates.

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Lesson #1

Assign *different weights* based on the identity of the peer-reviewers.

Feedback #2

- It would have been great if the expectations or guidelines to projects/presentations/labs/etc had been posted in a timely fanshion and explicitly; in particular, I am referring to the beginning of the course.

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Lesson #2

Post guidelines at the beginning of the class to make my expectation more clear (*esp.* the final exam).

Feedback #3

- The questions on the lab reports were often very difficult. Basically we had to read many papers not assigned until we found an answer that was only tangentially connected to what the question was asking and used that. Often we answered with guesses instead of actually knowing

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Lesson #3

- Over-expected students' self-motivation;
- Re-design questions (e.g., explicitly write papers needed)

Feedback #4

- Tianyu did an excellent job both lecturing and in the lab. The SEM demo was my favorite part and it really helped excite me about future research in the field and being able to use

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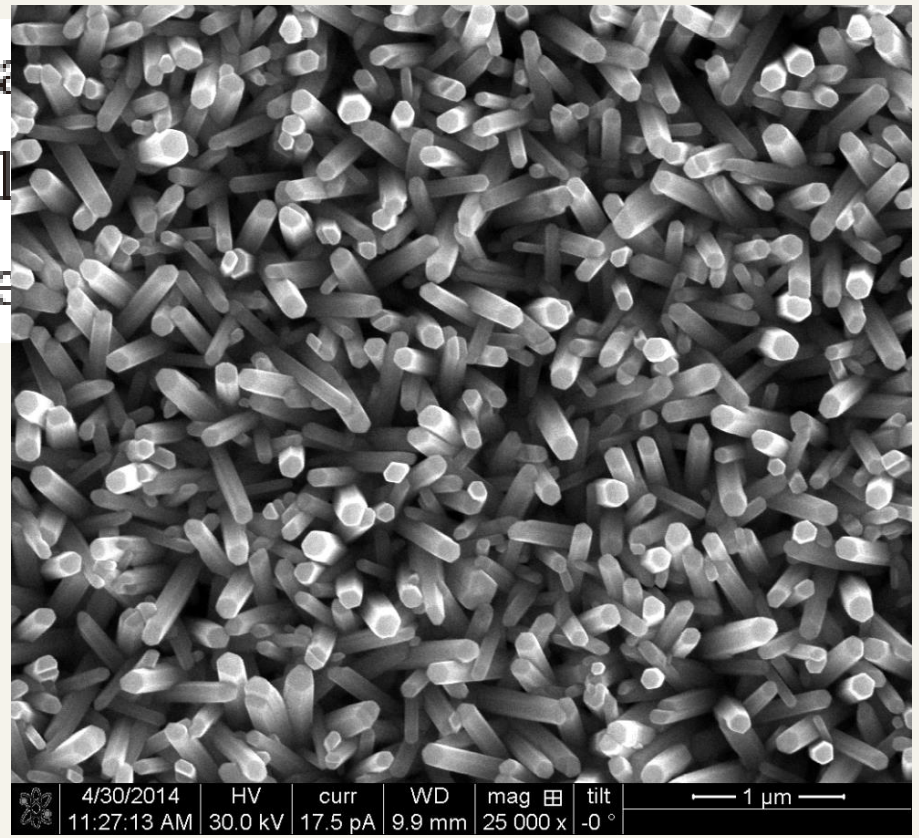
Nanowires



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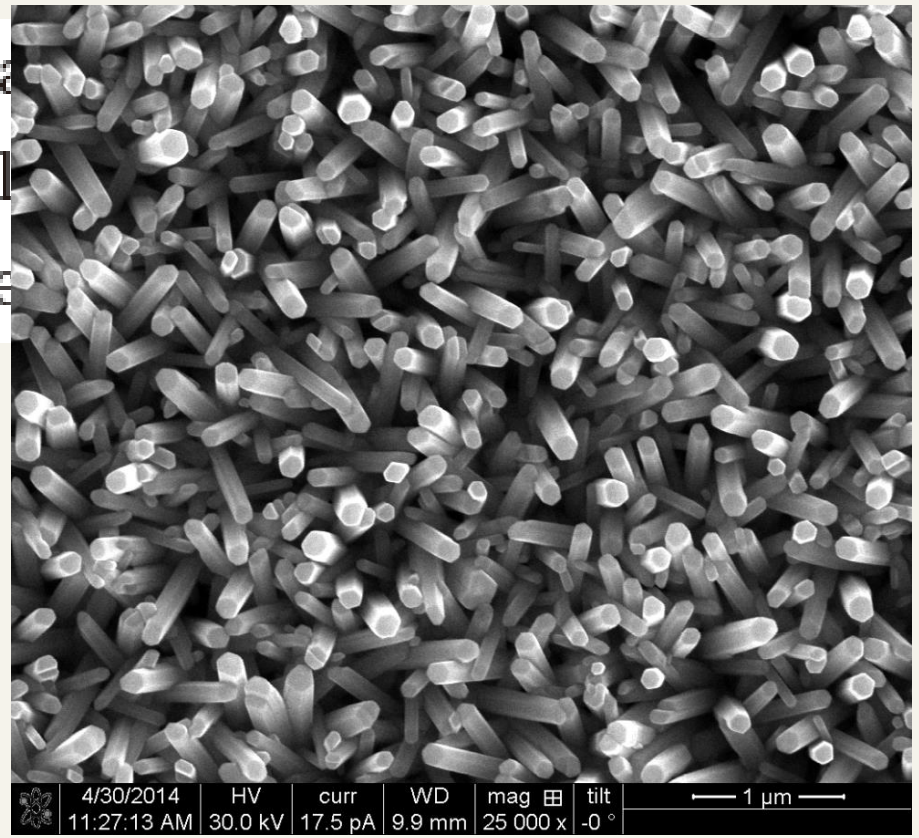

Lesson #4

Nanowires

- SEM (Scanning Electron Microscopy)
- Expose students to some advanced instruments for motivation.

Epilogue

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11. Instructor's overall effectiveness as a teacher **4.8**/5.0

…

17. The course overall as a learning experience **4.8**/5.0

THANK YOU

- Course Website

http://liutianyuresearch.weebly.com/nanomaterials-for-energy-storage-devices.html

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