



2011/09/13
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Introduction to Nanotechnology

- 2011/09/13 – 2012/01/10 (18 Weeks)
- Instructor: Yi-Chung Tung, Ph.D. (董奕鍾)
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- Website: www.rcas.sinica.edu.tw/faculty/tungy.html
- Class: Tuesday 9:40am – 12:30pm at IOP Building Room P101
- Grade: 30% Midterm + 40% Final + 30% Final Report (Oral + Report)
- Midterm: 2011/11/15
- Oral Presentation: 2012/01/03
- Final: 2012/01/10
- Reference: Handouts and Journal Papers



Midterm and Final Exams

- Close Book
- 2-hour written exam (2011/11/15, 2012/01/10, 10:00 am – 12:00pm)
- The exams will cover lecture notes (lecture slides), class notes, and assigned paper reading.



Final Report

- Due at the beginning of the last class.
- 15-minute presentation + 5-minute QA (conference style presentation)
- 2 related journal papers (recent 5 years)
- Prefer from high impact factor journals and/or highly cited papers.
- Journal examples: Nature, Science, Nature Biotechnology, Nature Medicine, Nature Materials, Nature Methods, Nature Physics, PNAS, Advanced Materials, JACS, Biomaterials, Analytical Chemistry, Lab on a Chip, etc.
- What is Impact Factor? How to check Impact Factor? How to check citation numbers? What do your advisors care?
- Web of Science: www.isiknowledge.com
- How to find good papers?



Final Report

- 15-minute oral presentation
 - Why is the topic interesting?
 - What “nano” is so unique and advantageous in the papers?
 - What have been done in the previous research?
 - What have been done in the papers?
 - How the papers did it?
 - What can be done in the future?
 - Your thought!
- Final Report
 - 5 pages, including references (maximum 20)
 - 12 Font, Times New Roman
 - Single column, single line space
 - The template will be provided



Impact Factor

- The 2010 impact factor of a journal would be calculated as follows:

A = the number of times articles published in 2008 and 2009 were cited by indexed journals during 2010.

B = the total number of "citable items" published by that journal in 2008 and 2009. ("Citable items" are usually articles, reviews, proceedings, or notes; not editorials or Letters-to-the-Editor.)

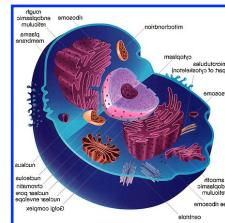
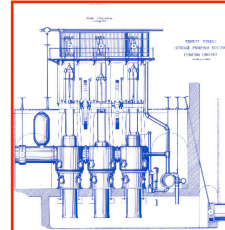
2010 impact factor = A/B .

- (Note that 2010 impact factors are actually published in 2011; they cannot be calculated until all of the 2010 publications have been processed by the indexing agency.)



Schedule

- Week 01 (09/13) Introduction to Nanobiotechnology
- Week 02 (09/20) Introduction to Micro/Nanofabrication Techniques
- Week 03 (09/27) Review of Basic Mechanics and Dynamics
- Week 04 (10/04) Review of Fluidic Mechanics, Introduction to Micro/Nanofluidics
- Week 05 (10/11) Entropy, Temperature, Free Energy, and Entropic Forces
- Week 06 (10/18) Surfaces and Interfaces
- Week 07 (10/25) Review of Material Sciences
- Week 08 (11/01) Introduction to Material Characterization
- Week 09 (11/08) Polymer Dynamics
- Week 10 (11/15) Midterm Exam (40%)
- Week 11 (11/22) Cells I
- Week 12 (11/29) Cells II
- Week 13 (12/06) Biomolecules I
- Week 14 (12/13) Biomolecules II
- Week 15 (12/20) Biomedical Micro/Nanodevices I
- Week 16 (12/27) Biomedical Micro/Nanodevices II
- Week 17 (01/03) Paper Presentation (20%)
- Week 18 (01/10) Final Exam (40%)



What is Nano?

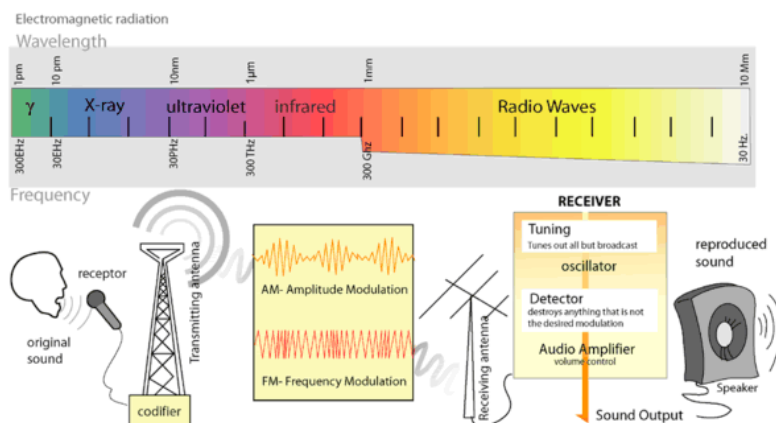
- Nano = 10^{-9}
- Do the math:
 - Mountain Everest Height: 8848 m
 - $8848 \times 10^{-9} \text{ m} = 8.48 \text{ } \mu\text{m}$
 - Human Hair Diameter: $\sim 25 \text{ } \mu\text{m}$





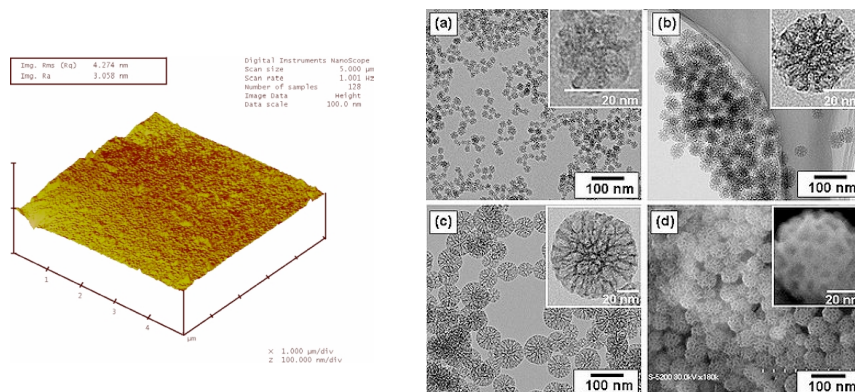
What is Nano?

- In Physics:



What is Nano?

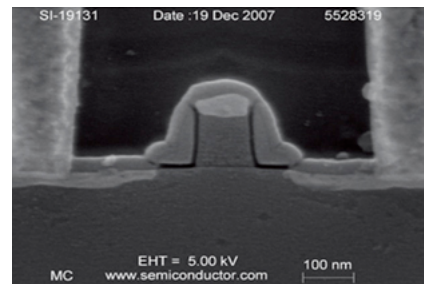
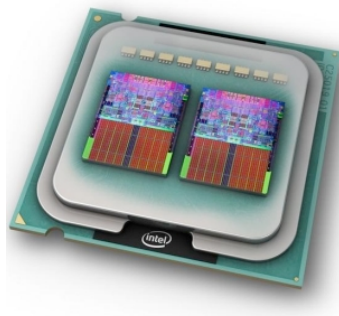
- In Chemistry:





What is Nano?

- In Engineering:



What is Nano?

- In Biology:

