ABSTRACT GUIDELINES FOR MSE 2069/1469 TERM PAPER

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INTRODUCTION

This section discusses the importance of the selected topic, including its relevance to the larger subject of nanostructures. In particular, this should include a simple description and background of the subject area, including the historical development of the technology, theory, or scientific controversy thay your paper will address. Use other introductions to review articles as a guide for the tone. The introduction is both a way to educate the reader and to advertise your article. It should be written to allow the reader without familiarity in the topic to 1) Learn the basic parameters of the topic that will be discussed, 2) Realize that it is an important topic that merits further research, and 3) Become motivated to read your review article because the topic is interesting.

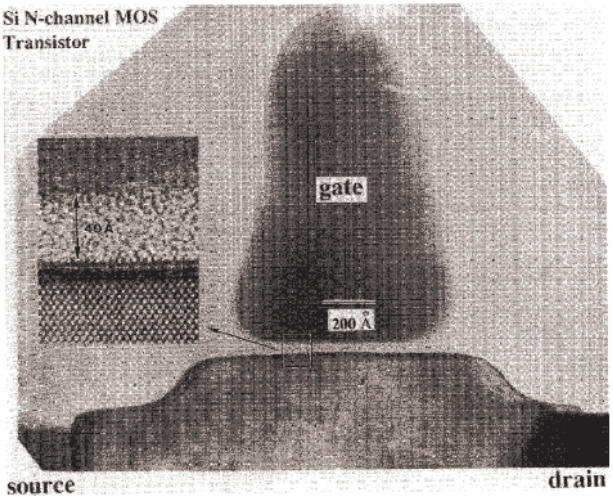

Figure 1. Add a single figure that captures the essence of your proposed topic. It can be a micrograph, plot, or other diagram, with a caption that describes the details of the figure. Compose the figure and caption so that a reader, even if they look only at the figure (and skip all the other text), could get an idea what your topic will be about.

OVERVIEW

This section has a brief outline of the paper, you will mention the specific subtopics that will be in the paper. Because space is limited, you can't put in a lot of details. This section is more similar to the abstract in a research paper—terse and full of details. The overview serves two purposes, 1) It helps you begin the process of organizing your paper, deciding the scope of what you will write about, as well as thinking about how it will be organized, 2) It provides the potential reader with a quick summary of what will be in the paper so that they can decide if they would like to invest the time in reading it.

Keep in mind that your entire 'abstract' should fit on a single page, single spaced with a font size 10-12 points. Limiting this document to a single page makes re-distribution and class voting much easier. Please include a number of important references that you plan to use (minimum 3) at the bottom of the page as shown here. Please include full references with titles if possible, even for journal articles.

REFERENCES

1. M. Kohler, W. Fritzsche, Nanotechnology - An Introduction to Nanostructuring Techniques, Wiley VCH (2004).
2. C.P. Poole, F.J. Owens, Introduction to Nanotechnology, Wiley Interscience (2003).
3. M. Di Ventra, S. Evoy, J.R. Heflin, Introduction to Nanoscale Science and Technology, Kluwer Academic (2004)
4. B.B. Nissan, "Nanoceramics in biomedical applications", MRS Bulletin, Vol. 29, pp. 28-32 (2004).
5. T. Abraham, "Nanoceramic applications emerge", American Ceramic Society Bulletin, Vol. 83, pp. 25-36 (2004).

A. TOPICS

There are thousands of possible topics concerning nanostructures—the field is huge! Below are a number of subjects, most of which will be considered in this course. If you are unsure if a topic outside these areas is relevant, or need help in sharpening the focus, please ask.

A.1. Nanolithography

- EUV Lithography - materials challenges in reticle and multilayer reflector technologies
- Materials issues in sub-100nm lithography (resists, etching, defects)
- Non-optical and direct write lithography – (e-beam, FIB, STM, etc.)
- Nano-imprint lithography
- Nanoelectromechanical systems (NEMS), lithography and materials issues

A.2. Nanostructures from the Vapor

- Vapor deposition of quantum heterostructures, SiGe, III-V, other materials, structure-property relationships
- Kinetics of nanoscale surface evolution in sputtering, MBE, laser ablation, etc
- Vapor phase nanocluster formation, nanocluster deposition on a surface
- Carbon nanotube formation, integration, properties

A.3. Nanostructures from the Liquid

- Synthesis of functional nanoparticles, phase selection, structure, coatings etc.
- Sol-gel deposition of functional nanoparticles, nanoparticle arrays
- Electrochemical deposition of nanostructures on surfaces of different compositions

A.4. Nanostructures from the Solid

- Nanocrystalline metals, synthesis, modification, properties
- Ion beam implantation/modification of nanostructured solids
- Nanocomposites (metal nanoparticles in a dielectric matrix)
- Nonlinear optical / photonic devices using nanostructured solids (materials challenges)

A.5. Nanostructure self assembly

- Fundamentals of surface ordering, driving forces for self-assembly
- Nanoparticle sintering, ordering
- Photonic bandgap nanoparticle lattices
- Templated self-assembly
- Nanotechnology integration (NEMS, automation, etc.)