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# Advanced Semiconductor Physics

EE698D, Fall 2004

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Research projects are an integral part of the course. It is essential that you get started early on the topic, so that you are sufficiently mature towards the end of the semester for innovative work. To encourage interaction, I am trying this new technique – you start in groups of TWO. Later, as the project progresses, I will divide the work equally among group members so that there are no issues with one person doing all the work. Discuss amongst yourselves and find somebody with whom you would like to team up for a project. I am suggesting some topics, and at the same time am open to your suggestions. Decide on a topic, search three high-impact papers, and list them in this sheet. Turn in this sheet in class on Tuesday, August 31<sup>st</sup>. This is your first homework.

## Suggested Research Topics

- 1) Electron velocity-field characteristics in III-V Nitride semiconductors
- 2) Optical Properties of Quantum Dots and Nanocrystals
- 3) Electron Transport in Semiconductor Nanowires – size dependence
- 4) Bandstructure modification by strain in semiconductors – Device Applications
- 5) Negative Refractive Index Materials: Curious Optical Properties
- 6) Spintronic Materials: Effect of Heterostructures and Quantum Confinement
- 7) Digital and Analog Alloys – device applications
- 8) Development of a software tool for simulating transport in semiconductor quantum structures (if you are good in programming)
- 9) Phonons in quantum-confined structures
- 10) Your suggestions ...

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Group Members:

Topic:

3 High-Impact Research/Review Papers:

- 1.
- 2.
- 3.

Due in class on Tuesday, August 31<sup>st</sup>, 2004.