The following are potentially interesting topics for midterm papers. Remember that these papers should be no more than 10 pages, and should be based on at least two papers from the recent literature. The point is not for you simply to paraphrase the journal articles. Rather, you should analyze and synthesize based on them. For example, you could compare and contrast the approaches in two papers, or you could explain how one builds on the work of the other. You can apply your critical faculties: if there’s something about one of the papers that you don’t like, or think was treated inappropriately, or think should have been considered but wasn’t, feel free to expound. Make sure to provide a little introductory material, and always be careful about citing other peoples’ work. Midterm papers will be due Wednesday, October 18, 2006, and should include a signed honor pledge!

I strongly suggest using ISI’s World of Knowledge (the online, searchable Science Citation Index) to help hunt for papers of interest and chase references. This database is accessible within the Rice web from the Fondren Library “Electronic Indexes” page.

Topics:

- Origins of “magic numbers” in clusters
- Build-up of electronic structure at nanoscale as number of atoms is varied.
- Differences in electronic structure between bulk solids and nanocrystals.
- Progress in single-dopant imaging and characterization.
- Charge transfer between molecules and surfaces.
- Schottky barriers and metal-molecule contacts in nanotubes.
- Nanoscale Schottky barriers.
- Bandgap engineering and novel effects (quantum cascade devices, Bloch oscillations).
- Quantum confinement effects on electronic structure.
- Semiconductor nanowires