

## **S-104.3610 Nanotechnology (5 cr)**

**Exam 12.1.2012**

*Please answer either in English or Finnish.*

1. Explain briefly (max. 2 pages altogether, draw schematics if needed):
  - a) electron beam lithography
  - b) dip-pen nanolithography
  - c) role of thiols in molecular electronics
  - d) Q-factor of a resonator
  - e) photonic crystal
  - f) Ostwald ripening in formation of quantum dots(each 1 p)
2. Principles of scanning probe microscopy, especially atomic force microscopy (6 p)
3. Structure, fabrication and properties of carbon nanotubes (6 p)
4. Nanoimprint lithography and comparison to other nanolithography techniques. (6 p)
5.
  - a) Explain “tip convolution” or “tip imaging” in SPM imaging. (3 p)
  - b) Explain origin of fluorescence color in semiconductor quantum dots. (3 p)