

Nanoscience I 2009. Final exam 23.11 2009

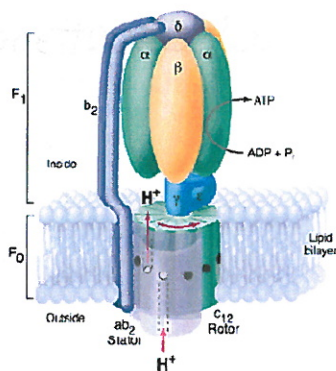
Remember to write your name, student number (or Finnish social security number) and from which University you are (HY/TKK). You may answer in Finnish, Swedish, English, or German.

1. (2 p/subpoint) Define briefly ($\lesssim 1/3$ page) the following concepts and (if it is not obvious) how they relate to nanoscience

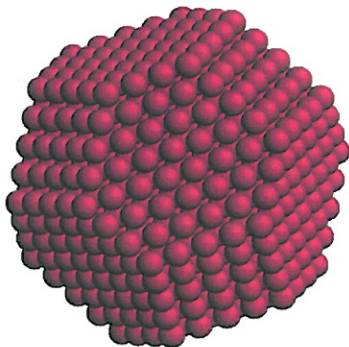
- a. Quantum dot
- b. Physical Vapor deposition
- c. Stranski-Krastanov growth mode
- d. Giant magnetoresistance (GMR)
- e. Atomic force microscope
- f. Electromigration
- g. Dendrimer
- h. Triblock copolymer

2. (4 p/subpoint) Recognize and describe briefly the following nanostructures

a.



b.



TURN OVER!

3. (4 p) Describe the phenomena and consequences that follow from reducing the dimensions of the thin films in silicon transistor technology to the nano-scale. Consider separately the scaling down of the insulator and conducting channel.

4. (4 p) Consider the following graphene plane. What chiral index (a, b) will a nanotube that is based on the vector \vec{OA} have, when the plane is cut along the dashed lines. Draw or explain how you found your solution.

