

Bago University
Department of Chemistry
Second Semester Examination, September 2019

Fourth Year BSc
(Chemistry Specialization)
Answer any six Questions

Chem 4111
Introduction to Nanoscience
Time Allowed: (3) hours

1. (a) Fill in the blanks with the correct word(s), unit(s), and etc., as necessary.
- (i) Nanostructure are _____ with sizes between molecular and micrometer structure.
 - (ii) Several techniques are used for synthesizing _____.
 - (iii) When heating a piece of glass to _____ above its glass transition point, sharp corner will round up.
 - (iv) Some surface is _____ and also called singular surface.
 - (v) When heating a piece of glass to temperatures above its glass _____ point, sharp corner will round up.
 - (vi) * For improved therapy and diagnostics, _____ medical devices are known as nanobot.
- (b) Select the correct statement(s), word(s), unit(s) and etc., given in the followings.
- (i) Nano means one (billionth, thousandth, millionth).
 - (ii) The nanowires are (zero, one, two) dimensional structure.
 - (iii) Nanostructures and nanomaterials possess a large fraction of surface atoms per unit (volume, area, length).
 - (iv) Surface atoms on an atomic flat [1 0 0] surface assuming the crystal has a simple (cubic, rhombic, monoclinic) structure.
 - (v) In the solar cell, (injects, captures, fuses) electron into the conduction band of the TiO_2 electrode.
 - (vi) When some desire functions are lost or malfunction, these nanodevice may become (out of control, repaired, relived).
2. (a) Define the following.
- (i) zero dimensional nanostructure
 - (ii) one dimensional nanostructure
 - (iii) two dimensional nanostructure
- (b) Illustrate the different approaches in the self-assembly of a nanoscale system.
3. (a) What challenge for the fabrication and processing of nanomaterials and nanostructures?
- (b) Draw the block diagram of preparation of nanoparticles.

P.T.O

4. (a) Discuss that surface atoms relaxation reduce the surface energy in the preparation of nanoparticles by using the schematic diagram of atomic layers.
(b) Explain the developing mechanisms for surface charge density when a solid emerges in a polar solvent. Explain with the Nernst equation.
5. (a) Describe the limitation of electrostatic stabilization can be utilized in the fabrication of stable nanoparticles.
(b) How did you understand the interaction between polymer and solid surface with schematic representation of different polymers?
6. (a) What is the functioning of cantilever of atomic force microscopy (AFM) in nanomechanics?
(b) Describe the biological application of nanoparticles.
7. (a) Illustrate the electric potential at the proximity of solid surface by using the surface charge determining ions and counter ions.
(b) Discuss the application of nanomaterials for bioelectronics devices by using a field effect transistor (FET).
