Uva Wellassa University of Sri Lanka
Faculty of Applied Sciences
Department of Science and Technology
400 level 1st Semester Examination – July / August 2019
SCT 447-2 Nano materials and Nanotechnology

Instructions to candidates
Duration: Two (02) Hours
Number of Questions: Four (04 (Four)
Answer all questions
Marks allocation: 400

Index Number

1.

i. Write two most commonly used wide-band gap oxide semiconductors in the field of nano-technology.

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ii. Write three most commonly used materials to prepare nano-powder or nano-colloids in the field of nano-technology.

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iii. What are the most promising four colors that you could expect with the decrease of the size of the gold particles?

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iv. Write two reasons, why bulk gold is yellow in color while small gold clusters are in different colors.

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v. Write two peculiar properties of the absorption spectra that you can expect for a nano-gold solution.

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vi. What do you mean by the term of blue shift in the absorption spectrum?

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vii. What is the color of "Lycurgus cup" under illumination of reflected light mode?

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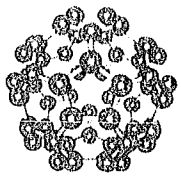
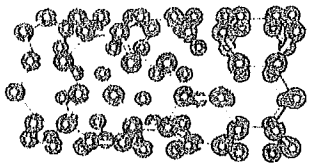
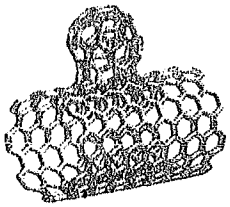
viii. Identify following allotropes of carbon.







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ix. Write two similarities for all the structures in part viii.

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x. Write three examples for spherical fullerenes.

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(10 X 10 marks)

2.

i. In which instrument that you could distinguish amorphous carbon and diamond practically?

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ii. Write two types of naturally available fullerenes.

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iii. What are the two major processes for fabrication of nanostructures?

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iv. Write four examples for bottom-up approach in the fabrication of nano-clusters.

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v. What are the three major geometrical types of carbon nano-tubes?

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vi. Propose a technique to purify carbon nano-tubes.

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vii. Can you directly use TiO_2 to prepare solar cells to solar conversion on the earth?

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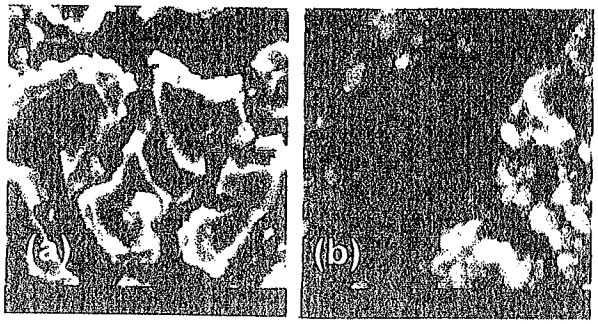
viii. SEM images of two different thin films made of the same material are given below.



a. Which film has more optically active area than its geometrical area?

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b. Which film produces more light-to-electricity conversion efficiency, if you used both (a) and (b) films to prepare a solar cell?

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ix. Write major drawback of preparation of a thin film by Langmuir-Blodgett techniques.

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x. Which force is predominant when working in nano-systems.

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(10 X 10 marks)

3.

i. Write four reasons as to why we have to take special care while working with nano-powders.

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ii. Who will get affected by nano-materials?

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iii. Discuss the advantages and disadvantages of using nano-powder in facial cream.

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iv. Assume that a vegetable or fruit parcel is given to you rapped in a bag manufactured by polyester mixed with Bis(benzoxazoy). Explain how would you determine whether the fruits or vegetable is squashed or not without opening the bag.

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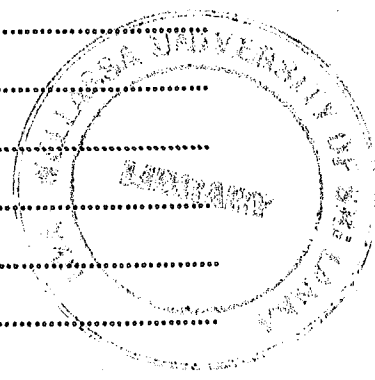

(100 Marks)

4. Discus a method to prepare carbon nano tubes at room temperature starting from Sri Lankan graphite.

(100 Marks)