Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 level 2nd Semester Examination – Sept/Oct 2015
SCT 393-1 Scientific Writing

Instructions to candidates
Duration: 01 hour
Number of questions: 02 Essay questions
Answer all questions
Mark allocation: 100 mark

Read following paragraph and answer the question 1.

Dr. Prasad M. Sirimanne (email:psirimanne@hotmail.com) joined to the Department of Science and Technology, Faculty of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka in 2010. Dr. Gamaralalage Rajanya Asoka Kumara is working in the Department of Chemistry, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka. Since UWU with the lack of research facilities Dr. Sirimanne made research collaboration with Dr. Kumara to study the cocktail effect of N719 and black dye on a solid-state dye-sensitized solar cell. Dr. Kumara used funds obtained from the National Science Foundation, Sri Lanka (grant No NSF/Fellow/2011/02). Dr. Kumara has two students Mr. M.M.C.S.K. Ranasinghe and Mr. W.M.N.M.B. Wanninnayake from the university of Peradaeniya. Mr. Ranasingh is a student of the Department of Chemistry while the person is from Department of Physics, of the same University.

As advice given by Dr. Kumara, Mr. M.M.C.S.K. Ranasinghe and Mr. W.M.N.M.B. Wanninnayake have assembled the experiment setup. However, Mr. M.M.C.S.K. Ranasinghe's contribution is much higher than that of Mr. W.M.N.M.B. Wanninnayake throughout the whole experiment. As the first step Mr. M.M.C.S.K. Ranasinghe made a semi-colloidal suspension of titanium dioxide as a stock solution by mixing 5.5 mL of acetic acid, 5 mL of tetraisopropyl titanate which was purchased from Aldrich company, USA and 1 drop of triton X-100 which was purchased from Sigma company, USA and 10 mL of 2 propanol. Then he added 3 mL of water to the above solution drop wise while stirring vigorously the solution. Finally he added 0.65 g of titanina powder purchased from Nihon Aerisol company, Japan, to the above mixture and was kept under vigorous stirring for 2-3 hours. They used this titanina semi-colloidal suspension as the stock solution. Then they spread a small amount of this stock solution on a preheated (150 Centigrade) conduction glass plate with a plastic dropper and allowed to dry for a few minutes. Then, he heated the titanium dioxide coated glass plates at 450 Centigrade for 30 min. He smoothly wiped loosely bonded titanium dioxide crust with a piece of cotton wool, after reaching the glass plate to the room temperature. He repeated this

02

procedure for ten times. He measured the thickness of titanium dioxide coated glass plate by a surface profiler with the model number of Alpha-step 500, which was made in USA. Then he immersed titanium dioxide coated glass plates in a 1:1 mixture of N719 which was purchased from Solaronix company in Switzerland and Black dye which was received from Prof. Yi-Bing Cheng, Department of Materials Engineering, Monash University, Wellington Road, Clayton, Vic. 3800, Australia, as a gift; solution (0.5 mg/L in dry ethanol) for overnight. He washed dye-coated titanium dioxide plates by boiling them in an acetonitrile solution under low flame. Then he dissolved copper iodide 0.6 g purchased from Nacalai tesque company from Japan with 15 mL of acetonitrile. He separated the precipitate of excess copper iodide by filtering. He added a small amount of methyl 3 ethyl imidazolium thiocyanate to this solution as a surfactant. He spread a small amount of the above solution carefully on the surface of a dye-coated titanium dioxide coated glass plates and heated at 150 Centigrade. He repeated this procedure until the conductivity of the CuI film reaches 50 Ωcm^{-2}. He constructed the cell by pressing a Pt-coated glass plate on the CuI|dye|TiO_2 electrode. They studied the photo-effects of the cell by illuminating the cell through TiO_2 layer by a sola simulator purchased from Wacom company, Japan. More details of the experiment have been discussed in one of the papers published previously. That work is done by Prasad Manjusri Sirimanne, T. Shirata, Yetsuo Soga, Takahashi Jimo and published in J. Solid-State Chemistry. Title was Charge generation in a dye sensitized solid-state cell under different modes of illumination. There were five journal pages starts from page 215 and in volume 166 and it appeared on 2nd sub volume. Only the absorption spectra (UV-visible) of dye solutions were measured in UWU by the technical Officer Mr. M.D. Nilantha. The current-voltage characteristics of dye sensitized cells with the sensitizer of (a) N719, (b) Black dye and (c) 1:1 mixture black dye|N719 are shown in table 1.

Dye	J_{sc} / mA cm^{-2}	V_{oc} / V	ff	h %
Black	13.7	0.457	0.488	3.0
N719	15.3	0.483	0.514	3.8
Black + N719 (1:1)	18.0	0.512	0.502	4.6

Table 1: The performances of cells, where J_{SC}, V_{OC}, ff, h% denote photocurrent, open circuit voltage, fill factor and efficiency of the cell.

1.

a. Write the most appropriate way of the first page of manuscript based on the above paragraph.

(40 mark)

b. Write the most appropriate way of acknowledgement of the manuscript

(20 mark)

b. Write the most appropriate way of the reference of the manuscript

(20 mark)

2.

a. Why do we have to publish our results? (5 mark)

b. Write five methods that you can present your research findings to the society. (5 mark)

c. Write ten important sections in a manuscript. (5 mark)

d. What do you mean by plagiarism (5 mark)