Uva Wellassa University

Attachment I

Dr. Prasad M. Sirimanne has worked as a research scientist in the Department of Material Science, Faculty of Engineering and Technology, Monash University, Clayton, Victoria, Australia, since 2007 to 2010 in the group of Prof. Yi Bing Cheng (email. Cheng@material.MU.Au), under grant of Victorian government (Grant No. VIC/Fellow/2007/02). Currently, Prasad M. Sirimanne works attached to the Department of Science and Technology, Faculty of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka and has promoted as a Professor in Chemistry. During the stay of Prasad M. Sirimanne at Monash University, he supervised a Sri Lankan Ph.D. student. His name is H.C. Werasinghe and currently, he is working as a research scientist attached to Department of Engineering, CSIR, Clayton, Victoria, Australia. They studied the cocktail effect of N719 and black dye on a solid-state dye-sensitized solar cell.

As per advice given by PMS and YBC, HCW has assembled the experiment setup. As the first step HCW 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 Chemical Company, USA and 1 drop of triton X-100 which was purchased from Sigma Chemical Company, USA and 10 mL of 2-propanol. Then HCW added 3 mL of water to the above solution drop wise while vigorously stirring the solution. Finally he added 0.65 g of titania powder purchased from Nihon Aerisol Company, Japan, to the above mixture and was kept under vigorous stirring for 2-3 hours. HCW used this titania semi-colloidal suspension as the stock solution. Then he spread a small amount of this stock solution on preheated (150 Centigrade) conduction glass plate by 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. They 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 procedure for ten times and 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. HCW immersed titanium dioxide coated glass plates in a 1:1 mixture of N719 and Black dye those were purchased from Solaronix company in Switzerland solution (0.5 mg/L in dry ethanol) for overnight. Then he washed dye-coated titanium dioxide glass plates by boiling them in an acetonitrile solution under low flame. 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 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. HCW studied the photo-effects of the cell by illuminating the cell through TiO_2 layer by a solar simulator purchased from Wacom Company, Japan. ***More details of the experiment have been discussed in one of the papers published previously in 2004. That work is done by Prasad M. Sirimanne, T. Shirata, Tetsuo Soga and Takahashi Jimbo and was published in J. Solid-State Chemistry. The title was Charge generation in a dye sensitized solid-state cell under different modes of illumination. There were five journal pages and volume was 166 and it appeared on 2nd sub volume. The first page number of the article was 255.*** Only the absorption spectra (UV-visible) of dye solutions were measured by the Technical Officer Mr. M.D. John the Department of Material Science, Faculty of Engineering and Technology, Monash University, Clayton, Victoria, Australia. They have obtained photo-voltage of 657 mV, fillfactor of 73% and photo-current of 4.1 $mAcm^{-2}$ with a maximum light to-electrical energy conversion efficiency of 2.0% for the TiO_2|dye|CuI solar cell under 1 sun.