Fabrication of Dye Sensitized Solar Cells Using Locally Available Sensitizers

M.H.A.R. Samanchandra, W.A.D.D. Tharanga, and Asha S. Galhenage

Dye sensitized solar cells (DSSCs) are the one of the most promising third generation solar cells which based on mesoporous nanocrystalline titanium dioxide and organic dyes. DSSCs provide a technically and economically reliable alternative concept for current silicon based photovoltaic solar cells. In this study, DSSCs were fabricated using the dyes extracted from locally available natural plants of mangosteen, centella, beetroot, and turmeric. Extracted dyes were analyzed using UV-vis spectrometer. Photo anodes were prepared using regent grade TiO_2 powder. The TiO_2 films were coated on fluorine doped tin oxide glass substrates using doctor blade method and spray coating method. The film quality was examined using X-ray diffractometer and scanning electron microscope. The film prepared using spray coating method has better uniformity. DSSCs fabricated using the dye extracted from mangosteen have shown high efficiency than the DSSCs of other dyes. Two dyes were mixed; namely, dye X (a mixture of dyes from mangosteen and centella) and dye Y (a mixture of dyes from mangosteen and turmeric), and adsorptions of dyes from the mixtures were employed to enhance the solar cell efficiency by enhancing the light absorption range. The DSSCs fabricated with mangosteen and turmeric combination of dyes yielded the maximum performance.