Abstract for INC4 Japan Day

Dye-sensitized Solar Cells

Dye-sensitized solar cells (DSCs) have been widely investigated as a next-generation solar cell because of their simple structure and low manufacturing cost. In this presentation, the research and development activities in DSCs at SHARP Corporation are reported. An improvement of cell performance of DSCs was investigated by means of haze of TiO_2 electrodes and series-internal resistance. The incident photon to current conversion efficiency of the DSCs was greatly improved using TiO_2 electrodes with high haze, and fill factor was improved by reduction of series resistance based on the equivalent circuit proposed through electrochemical impedance spectroscopy (EIS) measurement. The highest single cell efficiency of 11.1% (aperture area: 0.219cm^2) was achieved and confirmed by a public test center (AIST). Upscaling of cell size to module was also investigated. An integrated DSC module was fabricated and the new efficiency record of 8.2% (aperture area: 26.50 cm^2) was also achieved. Finally, the durability and prospect of DSCs are briefly mentioned.