Contribution ID: **46** Type: **Poster**

Fabrication of SnO2 by RF magnetron sputtering for electron transport layer of planar perovskite solar cells

The requirements of electron transport layer (ETL) for high efficiency Perovskite solar cells (PSCs) are, for example, appropriate band energy alignment, high electron mobility, high optical transmittance, high stability, and easy processing. The metal-oxide ETLs that have been proposed for PSCs are, such as, TiO₂, SnO₂, etc. TiO₂ is usually used for ETL as a compact layer and a mesoporous layer. Both layers give relatively higher efficiency PSCs. However, TiO₂ layer has some limitations for PSCs such as it needs high-temperature process and yields low electron mobility. The effect of TiO₂ layer negatively affects the device stability under ultraviolet (UV) illumination. Recently, SnO₂ has attracted more attention as ETL for PSCs because it has diverse advantages, e.g., wide bandgap energy (3.5 –4.0 eV), excellent optical and chemical stability, high transparency, high electron mobility (˜240 cm²/V.s), and easy preparation. The SnO₂ ETL was fabricated by RF magnetron sputtering technique to ensure the chemical composition and uniform layer thickness when compared to the use of chemical solution via spin-coating method. The RF power was varied from 60 –150 W. The Ar sputtering gas pressure was varied from 1x10⁻³ –6x10⁻³ mbar while keeping O₂ partial pressure at 1x10⁻⁴ mbar. The thickness of SnO₂ layer decreases as the Ar gas pressure increases resulting in the increase of sheet resistance. The surface morphology and optical transmission of the SnO₂ ETL were investigated. It was found that the optimum thickness of SnO₂ layer was approximately 35 –40 nm. The best device shows J_{sc} = 27.4 mA/cm², V_{oc} = 1.03 V, fill factor = 0.63, and efficiency = 17.7%.

Author: Ms THANIMKAN, rattanaphon (Department of Physics, Faculty of Science, Chulalongkorn University)

Co-author: Prof. CHATRAPHORN, sojiphong (Department of Physics, Faculty of Science, Chulalongkorn University)

Presenter: Ms THANIMKAN, rattanaphon (Department of Physics, Faculty of Science, Chulalongkorn University)

Track Classification: Surface, Interface and Thin Films