

# **Ultrasonic sprayed multi-wall carbon nanotube for counter electrode application in dye-sensitized solar cells**

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Dye-sensitized solar cell(DSSC) have been regarded as a potential candidate for the next generation solar cells owing to their high energy conversion efficiency, low cost materials and simple fabrication process. DSSC is consisted of dye attached TiO<sub>2</sub>, electrolyte and counter electrode. Until now, expensive Pt electrode is mainly used for counter electrode. Because of stability in caustic electrolyte, multi wall carbon nanotube(MWCNT) have been investigated as new counter electrode. Moreover, MWCNT has low resistivity, superior electron emission property and large surface area. In this study, we used ultrasonic nozzle which makes tangled particles disperse. MWCNT film on fluorine-doped tin oxide(SnO<sub>2</sub>:F) glass substrate is prepared by ultrasonic spraying. The solution that we used in spraying process is made by using mixture of sulphuric and nitric acid. And we controlled MWCNT film thickness from 0.5 to 3 μm to optimize efficiency. Cyclic voltammetry and Impedance spectroscopy were measured to investigate electrochemical properties of CNT electrode. Compared with Pt based DSSC, MWCNT based DSSC has higher open circuit voltage and lower Fill Factor. Fill Factor increased with MWCNT thickness. Therefore, It was found that MWCNT is likely to be a very promising electrode material for DSSC.

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