



Silver nanowires mesh electrode for metal-semiconductor-metal perovskite solar devices.

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Solar cells are one of the most promising clean energy technologies due to their reasonably high energy conversion efficiencies and low carbon footprint. Traditional photovoltaic devices such as Si or thin films solar cells require multi-step fabrication processes that involve costly manufacturing processes, which decreases their competitiveness compared to other types of renewable and energy technologies [1]. Thus, a quest for high-performance PV devices with cost-effective and simple manufacturing has enormous industrial and economic significance.

Here, we report on the progress of our work on fabrication of simple metal-semiconductor-metal (MSM) perovskite solar cells (PSCs), in which the metal electrodes directly contact the perovskite layer to create Schottky junction solar cells.

The photovoltaic properties of MSM PSC will strongly depend on the asymmetry in work function values of two metal contacts which are gold back-contact electrode and silver nanowire (AgNWs) mesh [2, 3]. Modified polyol synthesis was used to produce AgNWs [4]. To achieve homogeneous, uniform and highly-conductive mesh formed by AgNW on the perovskite layer, various fabrication protocols (deposition technique, ambience, solvent, volume, etc.) have been tested. We have developed several protocols for obtaining AgNW mesh electrodes deposited on top of thin perovskite films on glass substrates with the sheet resistances of the AgNW mesh as small as $\sim 2 \text{ K}\Omega/\square$. Further experiments with AgNWs deposition are in progress to enhance the conductivity and, consequently, to fabricate MSM PSC device with desired performance. Four-point probe measurement system and scanning electron microscopy were used to characterize sheet resistance of AgNWs mesh electrodes on perovskite films and analyze their morphology, respectively.

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