Topical Symposia
Room Golden State Ballroom - Session TS3P-ThP

Processes of Materials for Printed and Flexible Film Technologies - TS3 Poster Session

TS3P-ThP-1 Organic and Perovskite Solar Cells based on 3D-Printed Transparent Conducting Electrodes, *H. Lee, B. Tyagi,* ***Jae-Wook Kang,*** Jeonbuk National University, Republic of Korea

The photovoltaic performance of organic/perovskite solar cells (OSCs/PSCs) are directly governed by the optoelectronic properties of the transparent conducting electrodes (TCEs) used. However, there exists a classic trade-off the optical transmittance and sheet resistance (R_{sheet}) in most of the TCEs which limited their usage in photovoltaic devices. Moreover, most of the solution-process based TCEs suffer from poor scalability, making them incompatible with large-area device application. To overcome these limitations, we demonstrate the innovative use of three-dimensional direct-ink writing (3D-DIW) techniques for the scalable fabrication of bottom/top transparent conducting electrodes (TCEs) in photovoltaic devices.The 3D-DIW technique allows us to use a wide selection of inks/pastes to form TCEs with various structures. A layer-by-layer printing strategy through 3D-DIW technique can produce TCEs with high aspect ratio and excellent optoelectronic properties unbounded by the transmittance-R_{sheet} trade-off.

TS3P-ThP-2 Development of a Microfluidic System for Oxygen Environment Detection in Cell Culture, ***Wen-Cheng Kuo***, *L. Wu, J. Wang,* National Kaohsiung University of Science and Technology, Taiwan

The development of bioreactors based on microfluidic chips has been the focus in the field of drug screening in recent years. In this study, a MEMS process was used to integrate a flexible Clark-type dissolved oxygen sensor into a wafer, and graphene materials with high mechanical strength were used to fabricate electrodes, and the surface modification properties of oxygen plasma were studied. Nano-silver particles (AgNPs) are doped, and electrodes are prepared based on the suction filtration method on a biocompatible Parylene substrate, and Nafion is coated on the electrodes as a selective thin film and a solid electrolyte layer. The bottom and outer layers are encapsulated with biocompatible Parylene, which can avoid cell rejection when implanted in the body, and integrate electrodes into the flow channel of PDMS material, which is conducive to monitoring the dissolved oxygen concentration of the cell environment. Electrode performance analysis was performed using an electrochemical analyzer. The measurement results show that at the two groups of flow rates, it can be seen that the linear range of dissolved oxygen concentration is 0.4-2.08 mg/L, the difference of current density is about 0.1 μA/cm^2, and the reliability is above 0.99. Sensitivity increases slightly with an increasing flow rate of approximately 3%. The response times were about 1.5 and 1.6 seconds, respectively, demonstrating the excellent sensor's response and repeatability.

TS3P-ThP-3 Radiation Effect on Trapping States Modification for Nanowire Junction-less Charge Trapping Flash Memory Devices, ***Che-Wei Lin,*** National Tsing Hua University, Taiwan*; D. Ruan,* Fuzhou University, China*; K. Chang-Liao,* National Tsing Hua University, Taiwan

Recently, charge trapping (CT) flash memory architecture has become the most mature non-volatile memory in commercial market. Following with the scaling trend, the high-energy extremely ultraviolet would be applied on development of high density memory integration and fabrication. Therefore, radiation effect for charge trapping (CT) flash memory will be one of the most important issues in the coming years. Notably, the radiation damage plays a completely different role for different trapping layer material, which may be strongly related to the original trapping states in trapping layer. It seems that the radiation illumination can provide a promising method to optimize the trapping level without complicated band-gap engineering.

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