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Well-aligned ZnO nano complex structures for applications of solar cell

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Well-aligned ZnO nano complex structure (rod & flower) with different thickness of seed layer was fabricated on glass substrate. The thickness of ZnO seed layer (ranged with 100~700 nm) was controlled by sol-gel spinning process, and nano-rod was grown on seed layer by a hydrothermal method. Additionally, nano-flower was fabricated on these nano-rods by controlling pH. Crystal structure of nano complex structure is determined to be hexagonal with c-axis orientation by means of x-ray diffraction (XRD). ZnO nano complex structures were investigated for microstructure by using field-emission scanning electron microscopy (FE-SEM). Nano-rods on seed layer were confirmed to have a diameter of 140~250 nm and a length of 1.1~1.4 μm according to thickness of seed layer. And fabricated nano-flowers by controlling pH were confirmed to have a size of about 9 μm^2 . We investigated UV-visible absorptions of seeds and nano-rods to the prominent absorption peak at 362 nm. And I-V curves were investigated to confirm the electrical properties of nano-rods with and without flower. In results, we demonstrate that the vertically aligned ZnO nano-structures are very promising for efficient photo-anode on dye-sensitized solar cell.

Key Words: ZnO, nano complex structure, dye-sensitized solar cell, hydrothermal method, ZnO seed layer