CdS Deposition onto Mesoporous Titania Films for Sensitizer of Photovoltaic devices by high Pressure Free Meniscus Coating

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The CdS nanocrystals can generate exciton by absorption visible range of lights, cause its photochemical properties (indirect band gap). The CdS is employed in many kinds of inorganic solar cells as a sensitizer or absorption layer. Conventional deposition processes of CdS, such as employed Self-assembled monolayer (SAM) technique, chemical bath deposition (CBD) and successive ionic layer adsorption and reaction (SILAR) are employed for the coating into nano-structured matrix. In this work, CdS are deposited by liquid carbon dioxide. Extremely low viscosity and surface tension of l-CO_2 can lead faster diffusion of CO_2 soluble precursor into the mesoporous oxide films. These unique physical properties of l-CO_2 have been utilized in thin film deposition and extended its area. The structural characteristics, the chemical compositions and the light absorption characteristics of the CdS on the TiO2 film were investigated using wide-angle X-ray diffractometry (XRD), X-ray photoelectron spectroscopy (XPS) and UV-Vis spectroscopy. High-resolution transmission electron microscopy (HR-TEM) was employed for QDs morphology. EPMA study were investigated for deposition uniformity. Phototovoltaic performance also analized.