



发光学应用及交叉前沿

水溶性V₂O₅在聚合物太阳能电池中的应用

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摘要：为了提高聚合物太阳能电池的能量转换效率,选择水溶性V₂O₅作为阳极缓冲层制备了结构为ITO/TiO₂/P3HT:PCBM/V₂O₅/Ag的电池器件。V₂O₅纳米线采用水热法制成。研究了V₂O₅浓度和退火温度对有机太阳能电池器件性能的影响。实验结果表明:V₂O₅质量浓度为300 μg/mL的器件的效率最高,达到了2.35%,远大于无阳极缓冲层器件的效率0.14%;80 ℃是V₂O₅退火的最佳温度。与热沉积方法相比,可溶液处理的V₂O₅作为阳极缓冲层具有工艺简单且可大面积制备的优点,电池的效率得到了较大幅度的提高。

关键词：V₂O₅ 溶液处理 太阳能电池 水热合成

Role of Solution-processed V₂O₅ in Organic Solar Cell

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Abstract: In order to improve the power conversion efficiency of the organic solar cell, a solution-processed vanadium pentoxide was used as an anode buffer layer. The solution-processed V₂O₅ nanowire was synthesised by using hydrothermal method. The device structure was ITO/TiO₂/P3HT:PCBM/V₂O₅/Ag. The influence of V₂O₅ concentrations and annealing temperature on the device performance was investigated. The experimental results indicate that the power conversion efficiency (PCE of 2.35%) is the highest when the V₂O₅ mass concentration is 300 μg/mL, much higher than that without anode buffer (PCE of only 0.14%). Moreover, 80 ℃ is the relative optimum annealing temperature of V₂O₅. Compared with thermal evaporation method, the solution-processed approach is relatively simple, attractive for mass production and greatly valuable for applications.

Keywords: V₂O₅ solution-processed solar cell hydrothermal method

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