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材料物理和化学

ZnO基薄膜晶体管有源层制备技术的研究进展

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摘要: 氧化锌基薄膜晶体管(ZnO-TFT)器件的性能受到多种因素的影响,如半导体有源层、栅介质层的质量、栅介质与有源层的界面质量,其中有源层的质量起到至关重要的作用,而在影响器件有源层方面,制备方法是其中一个重要的因素。目前,已有多种ZnO半导体有源层制备技术应用于ZnO-TFT的制备(如原子层沉积、脉冲激光沉积、射频磁控溅射、溶液法等)。为了更直观地了解各种制备技术所获得的ZnO-TFT器件性能的优劣,并让研究者在选择制备技术时有所参考,文章概述了各种有源层制备技术的特点,并比较了这些制备方法所制备的ZnO-TFT器件性能。通过对比各器件性能参数可以发现,脉冲激光沉积和射频磁控溅射所制备的ZnO有源层具有较优的性质,并被广泛使用。文章还对ZnO-TFT的优化方法做了简单介绍。

关键词: 氧化锌 薄膜晶体管 有源层 制备方法

Research Development on Preparation Technologies of Active Layer Preparation of ZnO-Based Thin Film

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Abstract: The performances of zinc oxide based thin film transistor(ZnO -TFT)are effected by many factors, such as the qualities of semiconductor active layer and dielectric,and the interface characteristics between active layer and dielectric. Among these factors, the quality of semiconductor active layer is the key factor. However, in the case of active layer, the fabrication method is an important factor. Nowadays, lots of fabrication methods are used to fabricate the active layer of ZnO-TFT, such as atomic layer deposition, pulsed laser deposition, radio frequency magnetron sputtering and solution-processed. In order to intuitively understand the performances of ZnO-TFT by different fabrication methods, and offer the reference for researchers in choosing fabrication methods, the characteristics of these methods are reviewed systematically, and the performances of their corresponding ZnO -TFT are discussed. Through comparing the performance parameters of devices, it can be found that pulsed laser deposition and radio frequency magnetron sputtering can make the performances of ZnO active layer better. The optimization methods of ZnO -TFTs are simply described.

Keywords: zinc oxide thin film transistor active layer fabrication methods

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