利用水熱法製備氧化鋁摻雜氧化鋅奈米線及其性質的探討

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摘　　要

本研究探討，在低溫的環境中利用水熱法的方式來形成氧化鋅奈米線。藉著製程參數的改變包括化學溶液中成長前後的 pH 值調整，溶液的濃度和成長的時間，來得到有不同的密度和長度的氧化鋅奈米線。進而經由高溫熱處理的方式，可改善氧化鋅奈米線的光學性質。另外利用水熱法成長所造成的晶體缺陷，配合半導體的擴散製程，將鋁利用加熱擴散的方式，摻雜鋁到氧化鋅奈米線中。並探討鋁摻雜氧化鋅奈米線的光學性質、晶體微結構、表面型態以及鋁在氧化鋅奈米線內的擴散情形。同時分析其在熱處理過程中，表面和內部缺陷在不同狀況之下受到破壞和修補的情形。

Al_2O_3 doped ZnO nanowires prepared by the hydrothermal method and their properties

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ABSTRACT

We prepared the ZnO nanowires by utilizing the hydrothermal method at the low temperatures . By controlling the process conditions such as pH value before and after growing , the concentration of the chemical solution , and growth time , the ZnO nanowires with the different density and the length of the ZnO nanowires can be obtained . With the high temperature thermal treatment , the optical properties of the ZnO nanowires can be improved . The aluminum can be diffused into ZnO nanowires at high temperature via the crystal defects produced by the hydrothermal method to obtain Al-doped ZnO nanowires . The optical properties , micro structure , surface morphology and diffusion profile of Al in the ZnO nanowires are studied . We also analyze the surface and inside defects destroyed and mended under different processing conditions during heat treatment .

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