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$_2$O$_3$ 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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