

Effect of Additives and Seeds on the Morphology of Hydrothermally Grown ZnO Nanowires

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In hydrothermal process, there are many important process parameters such as seed layer on the substrate, reacting agents in aqueous solution, growth temperature and time, which govern the thermodynamics in the growth system. Despite many efforts to understand the effect of these parameters and thus finally control the nanostructure of ZnO, there is still much room to explore further as to how these factors can affect the ZnO nanostructures. In this study, we investigate the effect of many different types of additives in growth solution and seed layer conditions on the ZnO nanostructures. It was found that an addition of trace amount of various additives can significantly influence the morphology and physical dimension of ZnO nanorods. In addition, the choice of ZnO seed size and the number of seed layer determines the degree of vertical alignment of ZnO nanorods. Finally, we demonstrate that the hierarchical structure of ZnO nanorods can also be controlled by the heat treatment of secondary seed layer on ZnO nanorods.