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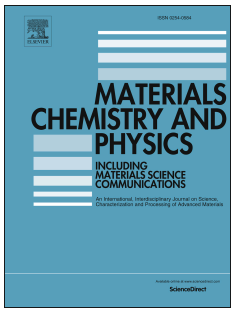


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# Ultra-fast epitaxial growth of ZnO nano/microrods on a GaN substrate, using the microwave-assisted hydrothermal method

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ABSTRACT**:** Well-aligned ZnO nano/micro-rods with identical crystallographic orientation were synthesized on a c-plane GaN template, using a microwave-assisted hydrothermal method at 50°C for duration of 2 minutes. The ZnO nanorods exhibited true epitaxial growth, in contrast to most of the previously reported methods, which involve nucleation on a ZnO buffer layer pre-deposited on the substrate. Homogeneous in-plane alignment as well as the *c*-axis orientation were confirmed by X-ray diffraction measurements and TEM analysis. More importantly, in the photoluminescence spectra of the nanorods a strong, narrow excitonic emission and an extremely weak deep level emission were observed, indicating high optical quality. The diameter was controlled by adjusting pH of the solution used in the growth process. The main achievement of the research was the opportunity to obtain oriented, high quality ZnO nano/microrods, using a surprisingly quick, cheap, and safe growth process, without the use of toxic substances or ultra-high purity compounds.

KEYWORDS: hydrothermal synthesis, ZnO nanorods, epitaxy

## INTRODUCTION

One-dimensional semiconductor nanowires and nanorods (NRs) have attracted increasing