Deposition Characteristics of ZnO Nanowire Arrays by Electrophoretic Deposition

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Abstract

With the development of various nanometer-sized electronic and photonic devices, high density and well-aligned nanowire arrays exhibit a great potential for fundamental research and practical applications.[1] Zinc oxide (ZnO) is a remarkable semiconductor with many potential applications such as electro-optical devices. In our previous works, aligned ZnO nanowire arrays embedded in anodic alumina membranes (AAM) have been synthesized by electrophoretic deposition (EPD).[2-3] In this study, the effect of applied voltage on the deposition of ZnO nanowire arrays was investigated, and the related deposition mechanisms of the AAM/ ZnO nanowire assembly during EPD at different voltages was discussed.

The results show that the morphologies of ZnO nanowire arrays were influenced by the applied voltages. In addition, the fibril percentage changes with the applied voltage. The photoluminescence (PL) properties of ZnO arrays were largely determined by surface state and heat treatment of the nanoparticles comprising the nanowire arrays.

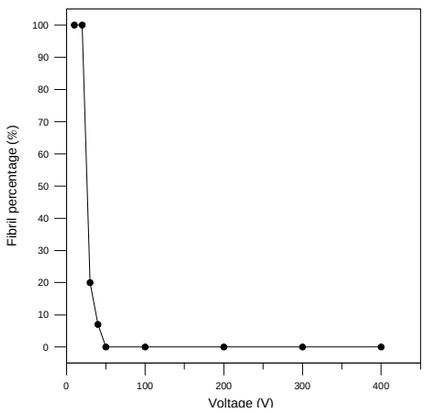

Fig. 1 The fibril percentage of ZnO nanowire arrays embedded in AAM as a function of the applied voltage

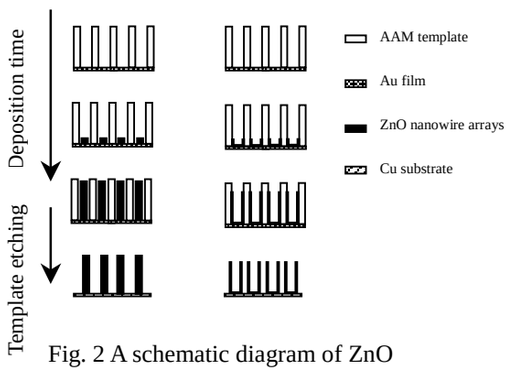

Fig. 2 A schematic diagram of ZnO nanofibrils and nanotubules deposited into AAM channels by EPD process at (a) low and (b) high voltage.

Reference

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