

## **Morphology and composition of well aligned ZnO nanorod arrays grown by a three step catalyst-free method**

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### **Abstract:**

In this work, we study the morphological and compositional changes of ZnO nanorod arrays grown on silicon substrates by a three step catalyst-free method. The method makes use of a drop-coating step followed by a Chemical Bath Deposition steps to create a dense well-aligned nanorod buffer layer which is suitable for subsequent Vapor Phase Transport (VPT) deposition, in order to obtain longer, high crystalline and optical quality ZnO nanorod arrays. These are promising structures for electronic and optical applications, such as the fabrication of dye-sensitized solar cells. The development of conical structures in the nanorod bases and the formation of a thicker double intermediate layer below the base of nanorods are the main features found using Transmission Electron Microscopy-related techniques. The strong dependence of growth morphology on the growth conditions such as the temperature ramp during the VPT process or the placement of samples with respect to the metal source is discussed.

**Keywords:** ZnO Nanorod array, Transmission electron microscopy Chemical Bath Deposition, Vapor Phase Transport.