

## Electrochemical Fabrication of Functional Metal Oxide Nanowires Using Alumina Template

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Hexagonally ordered nano-porous alumina template has been extensively used for the fabrication of nanowires and nanotubes materials. Pore diameter of alumina template is between 50 and 420nm. Partly hydrated anodic aluminum oxide consisting of thin barrier layer and porous layer is formed the anodization process in an acid electrolyte. The thickness of two layer is strongly dependent on applied voltage and the regularity of pore distribution depends on the first anodization time. Pore diameter of nano-templates with pore size of barrier layer are linearly increased with specific growth rate of 2.5nm/V and 1.3nm/V in oxalic acid, respectively.

In this work, highly ordered alumina templates with pore size of 200 nm were used for the fabrication of conducting metal oxide nanowires by electrodeposition technique.

First of all, we try to fabricate zinc oxide (ZnO) nanowires, but we did not observe ZnO nanowires due to the dissolution of alumina template by high pH condition. Thus, the control of appropriate pH and current density should be considered in next experiments.

Secondly, we succeed in the electrodeposition of Cu<sub>2</sub>O nanowires and morphological and structural analysis of deposited materials were performed. EDS data showed that the atomic concentration ratio of Cu/O of deposited material was about 2 indicating Cu<sub>2</sub>O nanowires. SEM and TEM images clearly showed compact Cu<sub>2</sub>O with aspect ratio of 20, i.e., the height of Cu<sub>2</sub>O wire of ca. 4.0 $\mu$ m.