

Fabrication of ZnO Nanowires using Nanoscale Spacer Lithography for Nanowire Device Applications

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Zinc oxide (ZnO) nanowires are considered to be one of the most important semiconductor nanomaterials for fabricating devices with applications such as optoelectronics, electronics, mechanics, and sensors. To date, nanowire devices have been fabricated using electron-beam lithography (EBL), focused-ion-beam (FIB) lithography, and dip pen nanolithography. Although these techniques have made great contributions to nanowire technology, their use on a large scale still remains a significant challenge due to their high cost and low throughput. In this work, we report the fabrication of ZnO nanowire arrays by nanoscale spacer lithography (NSL). This NSL technique was shown to be a robust method of creating ZnO nanowires with good reproducibility using a combination of ZnO ALD and low-damage ICP etching. The fabricated ZnO nanowire device shows good electrical transport and gas sensing properties to H₂ and CO in the concentration range of 500–5000 ppm. Therefore, we successfully demonstrated that this technique is a very promising method for various applications based on nanowire devices.