

SILICON NANOWIRES GROWTH IN A NANOPOROUS ALUMINA TEMPLATE

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The growth of semi-conductors nanowires is now of a great interest for nanoelectronic technology, which leads to new electrical or optical properties. The case of silicon nanowires is especially interesting since the silicon is a key material for the nanoelectronic technology. The realization of devices like sensors nanowires leads to technological stresses in terms of mechanical behaviour and positioning of the nanowires. For example the encapsulation and the planarization are difficult to realize after the growth of nanowires on a bulk substrate. We propose another way which consists to grow nanowires directly in a nanoporous cylindrical template made of porous alumina.

Porous alumina layers are composed of uniform porous structure with cylindrical pores parallel to the current lines [1]. They are obtained by direct electrochemical process under a constant voltage value in an aqueous acid solution. They are usually used in several fields of applications in physics, chemistry and biology as a host matrix. This nanoholes array can be used for nanoelectronics applications by filling the cylindrical pores with semi-conductive, electric or magnetic materials, and thus giving a nanowires array.

We show in this communication the growth of silicon nanowires in a nanoporous structure. We present the realization of the anodic oxidation of aluminium and we adjust parameters like the cell size, the pores diameter, the layer thickness and the lateral distribution. The silicon nanowires growth with chemical vapour deposition conditions is then performed in the particular vapour-liquid-solid (VLS) mode [2]. Previous results show the growth of nanowires on bulk substrate [3]. The growth condition of a nanowire in a nanopore is different from those on a bulk surface and will be discussed.

References:

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Figures: