

Metal assisted synthesis of aligned silicon nanowires by chemical etching method for opto-electronic devices

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The silicon nanowires (SiNWs) have received great interest because of their synthesis and application in many devices like transistors, memory cards, chemical sensors and solar cells. The SiNWs could be synthesized by different methods as chemical vapor deposition (CVD), thermal evaporation but these growth mechanisms have limitations of high temperature or high vacuum and requires complex equipments. In this work, we present the simple, low-cost and Ag-catalyzed solution etching techniques to synthesize aligned SiNWs on the single-crystalline silicon substrate at room temperature. During synthesis, the silver nanoparticles were first deposited on the silicon surface and formed nuclei which behaved as a cathode, the area surrounding the nuclei acted as an anode which thereafter, etched away and dissolved into the solution. The synthesized aligned SiNWs were of average length $\sim 11\mu\text{m}$ and diameter $\sim 100\text{nm}$. The synthesized SiNWs could be applied for the application of Si-solar cells, DSSCs and hybrid solar cells.