

GROWTH OF SILICON NANOSTRUCTURES BY THERMAL EVAPORATION USING NICKEL CATALYST

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ABSTRACT

One dimensional silicon nanostructures were synthesized by thermal evaporation technique using nickel catalyst. The silicon powder that served as a starting source material was evaporated at 1050°C in nitrogen gas flow. Nickel-coated Si(111) substrate was used to collect the silicon nanostructure products that positioned at 3 to 12 cm from the source material. By controlling the growth temperature, duration and substrate location the silicon nanostructures have been successfully produced. The FESEM equipped with EDX spectrometer was used to investigate morphology and elemental composition and TEM for investigation of size and shape of silicon nanostructures. Needle-like silicon nanowhiskers with a spherical tip is the most obtained nanostructure products. The EDX measurements confirmed the silicon structure of the nanowhiskers and the existence of a nickel dot on the tip. Therefore, the vapour-liquid-solid (VLS) mechanism was proposed for growth process of the silicon nanowhiskers.

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