

**【NP-07】**

## **Synthesis of titanium carbide nanowires by laser vaporization method**

김연수, 손정인, 홍현기, 이성훈  
광주과학기술원 신소재공학과

Nanoscale one-dimensional(1-D) materials such as nanowires and nanotubes are a focused research field due to their importance in fundamental physics study and potential applications of nanodevice. In this research we have synthesized the titanium carbide nanoscale one-dimensional structure by using pulsed laser ablation (PLA) method and pulsed laser ablation/ chemical vapor deposition (PLA-CVD) method on catalyst metal deposited Si substrate. The source materials for nanowire growth (C, Ti) were generated by the laser vaporization. Au and Ni acting as a catalyst metal for TiC nanowire growth were deposited on the Si (100) substrate by pulsed laser deposition (PLD). Catalyst metal film broke up into nano-sized droplet. We flowed ammonia gas (NH<sub>3</sub>) for Ni catalyst to activate and remove the oxide. The vapor-liquid-solid (VLS) growth mechanism is responsible for the TiC nanowire synthesis. The general morphology of the product was observed by scanning electron microscopy (SEM) images. The products (PLA and PLA-CVD) were smooth and wire like structure with uniform diameter of the order of 30-80 nm and the length typically up to several micrometers. In the side view images of PLA-CVD products, TiC nanowires were not vertically aligned. They were curved and curled up. The products (PLA and PLA-CVD) were characterized by powder X-ray diffraction patterns. We confirmed that the crystal structure of titanium carbide nanowire was a face-centered cubic (NaCl type) structure. We used transmission electron microscopy (TEM) to observe the further morphologies. TEM images showed wire like and tube like structure. High-resolution TEM image showed that the tube like structure were multi-walled and had closed tip.