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Hot-filament 플라즈마화학기상증착법 이용한 패턴된 DLC층 위에 탄소나노튜브의 선택적 배열

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Carbon nanotubes (CNTs) have attracted considerable attention as possible routes to device miniaturization due to their excellent mechanical, thermal, and electronic properties. These properties show great potential for devices such as field emission displays, CNT based transistors, and bio-sensors. The metals such as nickel, cobalt, gold, iron, platinum, and palladium are used as the catalysts for the CNT growth. In this study, diamond-like carbon (DLC) was used for CNT growth as a non-metallic catalyst layer. DLC films were deposited by a radio frequency (RF) plasma-enhanced chemical vapor deposition (RF-PECVD) method with a mixture of methane and hydrogen gases. CNTs were synthesized by a hot filament plasma-enhanced chemical vapor deposition (HF-PECVD) method with ammonia (NH3) as a pretreatment gas and acetylene (C2H2) as a carbon source gas. The grown CNTs and the pretreated DLC filmswere observed using field emission scanning electron microscopy (FE-SEM) measurement, and the structure of the grown CNTs was analyzed by high resolution transmission scanning electron microscopy (HR-TEM). Also, using energy dispersive spectroscopy (EDS) measurement, we confirmed that only the carbon component remained on the substrate.