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### **Structure-Controlled Synthesis of Single-Walled Carbon Nanotubes<sup>1</sup>**

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Single-walled carbon nanotubes (SWNTs) present structure-determined outstanding properties and SWNTs with a single (n, m) type are needed in many advanced applications. However, the chirality-specific growth of SWNTs is always a great challenge. Carbon nanotubes and their caps or catalysts can all act as the structural templates to guide the formation of SWNTs with a specified chirality. SWNT growth via a catalyzed chemical vapor deposition CVD process is normally more efficient and therefore of great interest. We developed a new family of catalyst, tungsten-based intermetallic nanocrystals, to grow SWNTs with specified chiral structures. Such intermetallic nanocrystals present unique structure and atomic arrangements, which are distinctly different from the normal alloy nanoparticles or simple metal nanocrystals, therefore can act as the template to grow SWNTs with designed (n, m) structures. Using W<sub>6</sub>Co<sub>7</sub> catalysts, we realized the selective growth of (12, 6), (16, 0), (14, 4) and other chiralities. By the cooperation of thermodynamic and kinetic factors, SWNTs with high chirality purity can be obtained. .

<sup>1</sup>Structure-Controlled Synthesis of Single-Walled Carbon Nanotubes