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Diameter Controlled Growth of SWCNTs using Ru as Catalyst Precursors Coupled with Atomic Hydrogen Treatment

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In this work, we present a practical approach for controlling Single Walled Carbon Nanotubes (SWCNTs) diameter distribution through thin film Ru catalyst coupled with hydrogen pre-treatment. Uniform and stable Ru nanoclusters were obtained after dewetting the Ru thin films under atomic hydrogen pre-treatment. SWCNTs were synthetized by double hot filament chemical vapor deposition (d-HFCVD) on SiO_2/Si substrates at different temperatures. We found that the temperature is an important synthesis parameter that influences the diameter distribution of the final SWCNTs. Statistical analysis of the Raman radial breathing modes evidences the growth of highly enriched semi-conducting SWCNTs (about 90%) with narrow diameter distribution that correlates directly with the catalyst particle size distribution. Electrical measurement results on as-grown SWCNTs show good thin-film transistor characteristics.

Biography:

Dr. Fatima Bouanis, physico-chemist, received the master's degree from "Ecole Nationale Superieure de Chimie de Lille" and the PhD from "University des Sciences et Technologies de Lille" in 2009. From 2009 to 2011, she worked jointly at LPICM (Laboratoire de Physique des Interfaces et des Couches Minces)-Ecole Polytechnique France and ICMMO (Institut the Chimie Moleculaire et des Materiaux d'Orsay)-France as a post-doctoral fellow on carbon nanotube electronics and from 2011 to 2012, she worked as post-doctoral "sensors based carbon nanotubes" at LPICM and PSA. Since 2012, she is researcher at IFSTTAR-France within NACRE (LPICM-LISIS) joint research team and she is a member of Sense-City project team. Her research focuses on sp2 carbon-based selective sensing for urban environmental applications. She is involved in carbon nanotubes and graphene synthesis and collective organisation for advanced electronics and novel devices (CNT-based FETS, gas/biological sensors, Memristors, Inverters...). She supervised two PhD students, 1 post-doc and has supervised several master students. F. Bouanis authored or co-authored 11 peer-reviewed publications, and 2 patents. She is member of management committee of COST ACTION CA 15107 Multi Comp "Multi-Functional Nano-Carbon Composite Materials Network".

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