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Water-Assisted Highly Efficient Synthesis of Impurity-Free Single-Walled Carbon Nanotubes-"Super-Growth" KENJI HATA, DON N. FUTABA, KOHEI MIZUNO, TATSUNORI NAMAI, MOTOO YUMURA, SUMIO IIJIMA, Research Center for Advanced Carbon Materials, National Institute of Advanced Industrial Science and Technology (AIST) — We demonstrate an extremely efficient chemical vapour deposition synthesis of single-walled carbon nanotubes where the activity and lifetime of the catalysts are enhanced by water [1]. Water-stimulated enhanced catalytic activity results in massive growth of super-dense and vertically-aligned nanotube forests with heights up to 2.5 millimeters that can be easily separated from the catalysts, providing nanotube material with carbon purity above 99.98%. Moreover, patterned highly organized intrinsic nanotube structures were successfully fabricated. The water-assisted synthesis method addresses many critical problems that currently plague carbon nanotube synthesis. [1] K. Hata, et al., Science, 306, 1362 (2004).

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