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Synthesis of aligned carbon nanotubes using anodic aluminum oxide templates

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The anodic aluminum oxide (AAO) template of a typical self-ordered nanoporous material has regular and uniform pores of controllable diameter, length, and density. The regularity of AAO template was applied to synthesize carbon nanotubes (CNTs) arrays. We prepared AAO templates by two-step anodization process. Metal catalysts were electrochemically deposited at the bottom in the pores of AAO templates. The vertically aligned CNTs were synthesized on these AAO templates by rapid thermal chemical vapor deposition. We have investigated the effects of metal catalysts deposition, synthesis temperature, flow rate of gases, and composition of reacting gases of CNTs growth. Fabricated AAO templates and CNTs were analyzed by using scanning electron microscopy, transmission electron microscopy, and Raman spectroscopy.