Rapid Growth of 1-D Nanostructured Tungsten Oxide Thin Films in Flame

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1-dimentional nanostrucutured tungsten oxide has been found potential use in many applications due to its intrinsic electrochemical properties. It is known that 1-D metal oxide are typically synthesized under oxygen-lean condition. Herein, 1-D nanotube, nanowire/ nanorod and their derivative nanostructured sub-stochiometric WO_Xthin films were successfully obtained via a flame vapor deposition process. The morphology of WO_Xthin films were controlled by adjusting various process parameters including tungsten wire feed rate, deposition height, substrate temperature and deposition time. The possible growth mechanism of nanostructures was investigated and proposed. With newly designed constant wire feeding system, the stability of tungsten oxide vapor concentration and adjustable wire feeding speed could be realized, which offers a robust and sustainable approach for nanostructured metal oxide thin films growth with controlled morphology.