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High-yield growth of semiconducting tungsten oxide nanowires CHRISTIAN KLINKE, JAMES B. HANNON, PHAEDON AVOURIS, IBM T. J. Watson Research Center, Yorktown Heights, NY 10598 — We characterized the growth, composition, and electrical properties of crystalline WO_3 nanowires grown using a catalyst-free chemical vapor deposition method. We showed that growing the wires in a mixture of methane and hydrogen dramatically increases the yield compared to growing the wires in argon carrier gas. The high yield makes simple nanowire 'harvesting' schemes feasible. Additionally, we demonstrated that field-effect transistors can be produced using single WO_3 nanowires as the transistor channel. Devices made by using Ni as source and drain contacts are n-type and have good ON-currents and reasonable ON/OFF ratios. Scanning tunnelling spectroscopy gives a bandgap of about 2.2 eV.

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