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Competing gas phase reactions during vapor transport deposition of ZnO nanowires ERIC DRISCOLL, Lock Haven University, KEVIN RANGE, Lock Haven University, Department of Chemistry, MARIAN TZOLOV, Lock Haven University, Department of Physics — We present results illuminating some of the major chemical processes in the vapor deposition of ZnO nanowires. The analysis of our deposition experiments indicates that carbon dioxide is a major oxidizing agent rather than carbon monoxide as previously thought. Additionally, we present evidence that carbon monoxide will etch zinc oxide at high temperatures. Zinc oxide nanowires have been prepared by using chemical vapor deposition on silicon (100) substrates with a 10-15nm layer of gold as a catalyst. Zinc oxide and graphite powders were heated to approximately 1000°C in a tube furnace in a flow of argon. We have delivered oxygen gas specifically in the growth zone to facilitate the formation of high aspect ratio nanowire growth. Thermodynamics calculations were used to justify the growth and etching processes. Imaging of samples was performed with scanning electron microscopy. Chemical composition was determined by energy dispersive x-ray spectroscopy. Photoluminescence spectroscopy was used to characterize the emission properties of the zinc oxide samples.

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