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Study on the growth of ZnO micro and nano-structures at low temperature and atmospheric pressure M. MORALES, B. CLAFLIN, G.C. FARLOW, D.C. LOOK, Physics Department and Semiconductor Research Center, Wright State University — Deposition of ZnO from the vapor in flowing carrier gases has been studied for use in the growth of micro- and nano- structures. We have investigated how variations in the carrier gas composition and flow rate and the position of the substrate control the morphology of the nanostructures. Source material was either Zn powder or Zn acetate, either evaporated (powder) or decomposed (acetate) in the temperature range 500°C to 650°C in flowing Ar/O_2 at atmospheric pressure. It was also found that Zn powder must be washed in HCl to achieve reliable deposition at the lower temperatures. Scanning electron microscopy (SEM) images of samples grown from a Zn acetate source show micron-sized chimneys forming at 5 cm from the source, to 100 nm dispersed crystals at 7 cm or greater distance from the source. SEM images of samples grown from a Zn powder source show forrested needles ~ 100 nm in diameter by 1 micron long. Photoluminescence measurements from these samples show a dominate line at 3.36 eV with additional features at 3.32 and 3.37 eV. The line widths are ~ 3.5 meV, indicating good quality material. The usual gree-band emission is also observed.

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