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Effect of Substrate Annealing and Seeding on ZnO Nanowires Synthesized Using a Hydrothermal Method[1] ORLANDO LOPEZ, ASHLEY TUCKER, KIMBERLY SINGH, SPENCER MAMER, HUIZHONG XU, St John's Univ — ZnO nanowires have been extensively studied due to their remarkable mechanical, thermodynamic, electrical and optical properties. Amongst the various ZnO nanowire synthesis methods, the hydrothermal growth method is quite attractive due to its simplicity and tolerable growth conditions. In this work, we apply the hydrothermal method to grow ZnO nanowires on gold-coated glass substrates and study how different pre-growth treatment of the substrates affects the morphology, distribution, and dimensions of the ZnO nanowires. We have found that pre-growth annealing of the substrate at temperatures above 250 °C is required to have vertically aligned nanowires. Our results have also revealed that the nanowire density and dimension are dramatically different for substrates pre-seeded with ZnO nanoparticles and unseeded substrates. The ZnO nanoparticle seeds play an important role in providing nucleation sites that are much smaller than the critical size of precipitation out of the solution, resulting in nanowires of smaller dimensions for pre-seeded substrates. The dependence of the nanowire dimensions on the precursor concentration for both pre-seed and unseeded samples is also studied and discussed.

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