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Pinpoint Growth Mechanism Of ZnO Nanoprisms[1] DA-JUN SHU, XIANG XIONG, MU WANG, National Laboratory of Solid State Microstructures and Department of PhysicsUniversity, Nanjing University, Nanjing 210093, China, NATIONAL LABORATORY OF SOLID STATE MICROSTRUCTURES AND DEPARTMENT OF PHYSICSUNIVERSITY COLLABORATION — We investigate the growth mechanism of ZnO nanoprisms synthesized by thermal evaporation method. Temperature is tuned to control the growth driving force while other conditions are fixed. Classical nucleation theory and growth dynamics are used to analyze the competition between growth in lateral and vertical directions. Interfacial diffusion properties, step edge diffusion barrier and several other factors affecting the growth of nanostructures are taken into account. Based on these considerations we have established a model which suggests a quantitative relation between temperature and the size of nanoprisms. Programmed cooling processes are introduced into the thermal evaporation to verify the theoretical expectations. It is also demonstrated that a morphology-controllable hierarchical prisms, which is expected from our theoretical model, can be easily achieved by tuning the temperature.

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