Pinpoint Growth Mechanism Of ZnO Nanoprisms

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UNIVERSITY 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 tem-
perature and the size of nanoprisms. Programmed cooling processes are introduced
into the thermal evaporation to verify the theoretical expectations. It is also demon-
strated 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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