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**Preparation and Growth Mechanism of Nano-structure by Gas-Solid Reaction**

**Abstract:** The roller vibration mill was used to manufacture zinc quantum dots of 3-5 nm in dry mode and at room temperature, then the zinc quantum dots were hydrolyzed with steam under different temperature to obtain hybrid of ZnO and Zn nano-structures. The as-synthesized particles were characterized by XRD, TEM. The results showed that the nano-structure synthesized under 250 °C had the highest dispersivity featuring nano-flakes with nano-rods, that grew along the [0,1,-1,1] direction. The ZnO nano-rod grew related with nano-crystalline Zn, and top-up model was proposed for interpreting the nano-rod growth mechanism.

**Key words:** gas-solid reaction; nano-structure; hydrolyzation; growth mechanism; laser particle size analyzer; particle size analyzer; aimsizer; as-2011 micron laser particle size analyzer; as-2012 submicron laser particle size analyzer

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