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Catalyst-free thermal evaporation of Zn powder at atmospheric pressure

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Zinc-oxide is a direct band-gap semiconductor material and in its nanoscale form exhibits novel optical and electronic properties. A myriad of forms and shapes have been produced by a variety of deposition methods. These structures are of interest to researchers for application in various fields such as optoelectronics, sensors, biomedicine and solar cells. Thermal chemical vapour deposition is one such deposition method favoured by researchers. Thermal evaporation is based on the thermal sublimation of the source material, and in this work a simple method was utilized whereby zinc (Zn) powders have been heated to a temperature above both its boiling and melting point. The catalyst-free experiment was conducted in an open-ended quartz tube, at atmospheric pressure in air. No carrier gas was used in what is a pre-cursor experiment to controlled thermal chemical vapour deposition. Electron microscopy analysis revealed the growth of micro-sized tetrapods and pencils that contain both zinc and oxygen, with tapered nano-sized tips formed by the stacking of nanospheres of decreasing diameter.

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N/A

Main supervisor (name and email) and his / her institution

N/A

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Yes

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