

## A general low temperature route for large-scale fabrication of high-aligned ZnO nanorods

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Uniformly distributed highly aligned ZnO nanorods with diameter 50 –60 nm and 400–500 nm in length have been successively grown at low temperature on ZnO/Si by facile inexpensive aqueous solution method. The X-ray diffraction pattern (XRD) analysis showed high intensity of {002} peak. The strongest {002} reflection with narrow width denotes that the ZnO nanorods are well oriented along the normal direction of the substrate surface. Transmission electron microscopy (TEM) studies also showed that ZnO nanorods are single crystalline and they grow along the c -axis of crystal plane. The room temperature photoluminescence measurements have shown strong ultraviolet emission at 381nm a very weak blue band at 460nm and broad deep level emission at 580nm. The sharp excitonic emission and weak deep level emission peaks indicate that vertically aligned ZnO nanorods have lower defects and high optical properties. The synthesis of ZnO nanorods and growth parameters are controlled by reactant concentration, temperature and pH. This novel and facile methods holds promise for design of nanoelectronic and nanophotonic devices.