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Bidirectional growth of ZnO nanowires with high optical properties directly on Zn foil

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ABSTRACT

ZnO nanowires (NWs) were directly grown on zinc foils through a two-step process: (i) Zn foils fabrication and (ii) thermal oxidization at temperature 400 °C. The dense and orderly aligned ZnO NWs grown on Zn hexagonal-faceted surface presented preferential growth in the [101] orientation and showed bidirectional growth mode with an intersection angle of about 60°. The faceted and bidirectional growth mode of ZnO NWs would be applicable in the fabrication of planar nanodevices. The edge growth mechanism is proposed for the growth of NWs. In photoluminescence (PL) studies, we have observed exciton peak around 368 nm with a small PL full width at half maximum (~8 meV) and visible emission was strongly suppressed. These characteristics indicated that the ZnO NWs had high optical properties.

Keywords: Zn, ZnO, oxidation, nanowire, bidirectional growth, photoluminescence