

Growth of few-layer van der Waals materials on semiconductor nanowires

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Combination of different materials in complex nanowire (NW) heterostructures gives extra freedom to flexibly design their properties and add custom-made functionality, as well as NWs are a convenient template to study materials growth. First-time synthesis of various NW and layered van der Waals (vdW) material such as ZnO-WS₂ [1,2], ZnO-MoS₂ [3], ZnO-PbI₂ [4] and other ReS₂-based core-shell heterostructures was demonstrated. Structural, compositional and optical characterization was performed. Single-NW photodetectors were fabricated to investigate the photoelectric properties of such hybrid materials. It was found that even a few-layer thin vdW material coating can significantly improve the photodetection properties of ZnO NWs by modifying the light absorption and spatial distribution of charge carriers. Such novel heterostructures could also be used for other applications in optoelectronics and in photo- or electrocatalytic hydrogen evolution reactions. The financial support of LCS FLPP grant Izp-2018/2-0083 is greatly acknowledged.

References

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Figures

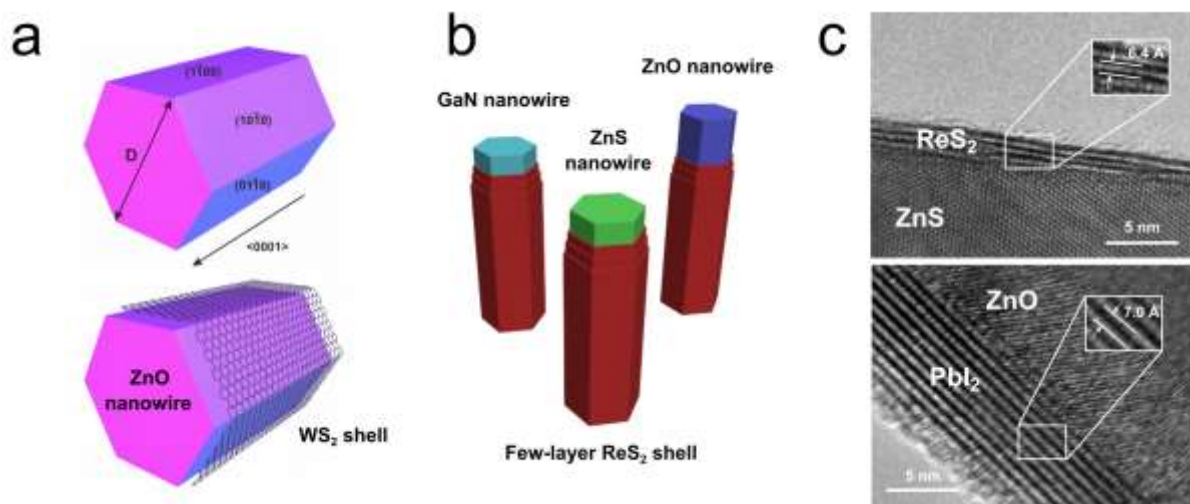


Figure 1: (a,b) Schematic representation of different as-grown core-shell nanowires; (c) transmission electron microscope images of different vdW material few-layer coating on nanowires.