

Vertically aligned growth of lead iodide nanowires via VLS-method

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Lead halide perovskites, such as methylammonium lead iodide (CH₃NH₃PbI₃) have demonstrated outstanding optoelectronic properties, promising extensive application in solar harvesting. Lead iodide (PbI₂) is attracted attention as an intermediate for vapor phase synthesizing perovskite. The morphology of PbI₂ nanowires (NWs) have been researched because it affects the properties of perovskite after conversion.

In previous VLS growth of PbI₂ NWs, the $[1\bar{2}1\bar{0}]$ oriented NWs have reported. Herein, we grow the $[0001]$ oriented NWs at tens of microns in length. Although $[0001]$ NWs are thermodynamically less stable than $[1\bar{2}1\bar{0}]$ NWs, we produce the $[0001]$ NWs with a high area density because the NWs epitaxially grow on the PbI₂ thin film. Unlike $[1\bar{2}1\bar{0}]$ NWs that grow at various angles, $[0001]$ NWs grow uniformly with perpendicular growth on a the substrate so that the NWs can be applied to devices with aligned morphology after transfer. Also, it is able to synthesize perovskite by simple vapor phase conversion. This research suggests that the possiblity of a new type of perovskite NW application.