

GUIDED NANOWIRE GROWTH KINETICS AND MECHANISM: SURFACE MATTERS

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Surface-guided growth of planar nanowires is an attractive way of creating aligned arrays of nanowires to enable their large-scale integration into practical devices, but the kinetics and mechanism of planar versus the regular nonplanar growth are poorly controlled and understood. Here we present for the first time kinetic data for planar nanowire growth supported by a theoretical model. Planar versus nonplanar nanowire growth rates show different power dependence on nanowire diameter, attributed to the dimensionality of precursor material diffusion. Whereas the regular nonplanar growth is dominated by surface-diffusion over the NW sidewalls, planar growth is found to be dominated by surface-diffusion over the substrate. This new knowledge enables much higher control over the diameter and length distribution of surface-guided nanowires in different material systems.



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