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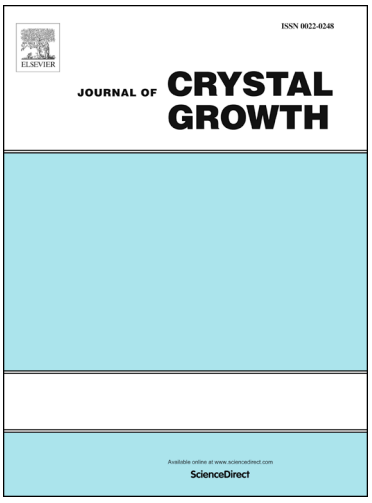

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Nanowire growth from the viewpoint of the thin film polylayer growth theory

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A B S T R A C T

The theory of polylayer growth of thin solid films is employed for description of the growth kinetics of single-crystal nanowires. Expressions are derived for the dependences of the height h and radius r of a given nanowire on time t, as well as for the $h(r)$ dependence. These dependences are applicable immediately after the nanowire nucleation on the substrate and thus include the period during which the nucleated nanowire changes its shape from that of cap to that of column. The analysis shows that the nanowire cap-to-column shape transition is continuous and makes it possible to kinetically define the nanowire shape-transition radius by means of the nanowire radial and axial growth rates. The obtained $h(t)$, $r(t)$ and $h(r)$ dependences are found to provide a good description of available experimental data for growth of self-nucleated GaN nanowires by the vapor-solid mechanism.

Keywords:
A1. Growth models
A1. Growth kinetics
A1. Nanowires
B1. Gallium nitride

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