Ga-assisted MBE grown GaAs nanowires: growth issues for large area photovoltaic devices

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Nanowires are filamentary crystals with diameters ranging from the few nanometer to ~100 nm. In the last 10 years, they have raised many expectations in terms of electronic and optoelectronic applications. Especially interesting is the use of nanowires in third generation solar cell devices. Single and multiple junction solar cells have been proposed to beat the efficiency-to-cost ratio imposed by nowadays technology.

Our work refers to the use of self-catalyzed GaAs nanowires obtained by Molecular Beam Epitaxy (MBE). We will start presenting the design requirements for nanowire based solar cells, in terms of nanowire length, diameter and spacing. After that, we will move on to explain the consequences for the fabrication of the ordered arrays that have to constitute the devices, in terms of growth mechanisms by MBE.

Finally, the results are then applied to the realization of nanowire-based solar cells. The future of this research area will be briefly discussed.