Guided Nanowire Optoelectronics

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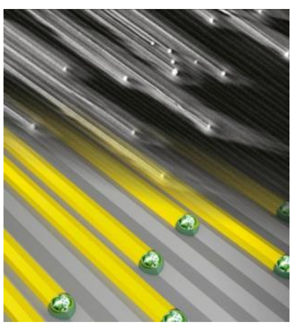
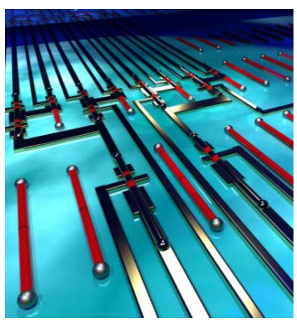
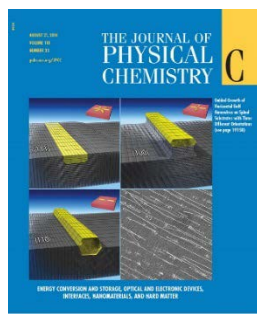
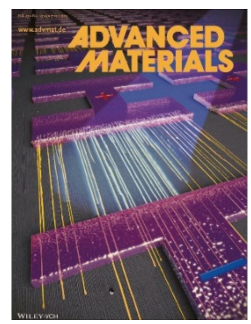
The large-scale assembly of NWs with controlled orientation on surfaces remains one challenge toward their integration into practical devices. During the last few years we reported the growth of perfectly aligned, millimeter-long, horizontal NWs of GaN [1], ZnO [2], ZnSe [3], ZnTe [4], CdSe [5] and other materials, with controlled crystallographic orientations on different planes of sapphire [1-5], SiC [6], quartz [7], and spinel [8]. The growth directions and crystallographic orientation of the NWs are controlled by their epitaxial relationship with the substrate, as well as by a graphoepitaxial effect that guides their growth along surface steps and grooves. As a proof of concept for future applications, we demonstrated the massively parallel "self-integration" of NWs into circuits via guided growth [9]. Here we will show how guided nanowires with complex morphologies and heterostructures can be used for the bottom-up fabrication of nano-optoelectronic devices, including photodetectors, photodiodes and photovoltaic cells [10]



References

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[2] *ACS Nano*, **6**, 6433 (2012).
[3] *Adv. Mater.*, **27**, 3999 (2015).
[4] *J. Phys. Chem. C*, 120, 18087 (2016).
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[10] *ACS Nano* **2017**, under revision.