

Abstract Submitted
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Guided Growth of Millimeter-Long Horizontal Nanowires with Controlled Orientations DAVID TSIVION, MARK SCHVARTZMAN, Department of Materials and Interfaces, Weizmann Institute of Science, RONIT POPOVITZ-BIRO, PALLE VON HUTH, Chemical Research Support, Weizmann Institute of Science, ERNESTO JOSELEVICH, Department of Materials and Interfaces, Weizmann Institute of Science — The large-scale assembly of nanowires (NWs) on surfaces remains one critical challenge toward their integration into practical devices. We report the vapor-liquid-solid growth of perfectly aligned, millimeter-long horizontal GaN [1] and ZnO [2] NWs with controlled orientations on different sapphire planes. The growth directions, crystallographic orientation and faceting of the NWs vary with each surface orientation, as determined by their epitaxial relation with the substrate, as well as by a graphoepitaxial effect that guides their growth along surface steps and grooves. Despite their interaction with the surface, these NWs display few structural defects, exhibiting optical and electronic properties comparable to those of vertically grown NWs. Further control was recently achieved by patterning the catalyst nanoparticles to produce NWs with well-defined locations, orientation and length. This enables the massively parallel integration of NW circuits. The guided growth approach paves the way to highly controlled NW structures with potential applications not available by other means. [1] D. Tsivion, M. Schwartzman, R. Popovitz-Biro, P. von Huth and E. Joselevich, *Science* **333**, 1003 (2011). [2] D. Tsivion, M. Schwartzman, R. Popovitz-Biro and E. Joselevich, *ACS Nano* **6**, 6433 (2012).

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