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Twinning Superlattices in Semiconducting Nanowires QIHUA XIONG, Department of Physics, The Pennsylvania State University, University Park, PA 16802 USA, J. WANG, Materials Research Institute, The Pennsylvania State Unviersity, PETER EKLUND, Department of Physics, The Pennsylvania State University — We report the first observation of quasi-periodic twinning superlattices (TSLs) in semiconducting nanowires. The periodicity of the superlattice appears to be controlled by $\Delta T = T_m - T$, i.e., the degree of undercooling of the liquid phase in contact with the solid phase during VLS growth, where T_m is the melting point of the solid phase. We present results from two III-V systems (GaP, InP) in which the superlattice is generated by the periodic 180° flipping of the <112> direction relative to the <111> growth direction of the nanowire. We suspect that our observations mean that a TSL structure can be grown in many compound semiconducting nanowire systems. Control of the superlattice period should allow significant design possibilities for thermoelectric, electronic and electro-optic applications. This work was supported, in part, by NSF-NIRT DMR-0304178

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