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Photovoltaic properties of axial in-situ doped SiGe heteronanowires SON T. LE, Department of Physics, Brown University, A.D. MOHITE, D.E. PEREA, H. HTOON, Center for Integrated Nanotechnologies, Los Alamos National Laboratory, P. JANNATY, A. ZASLAVSKY, School of Engineering, Brown University, S.T. PICRAUX, Center for Integrated Nanotechnologies, Los Alamos National Laboratory — We report on vapor-liquid-solid (VLS) growth and photovoltaic properties of axial in-situ doped Ge-Si heteronanowire (hetero-NW) solar cells. Modern VLS growth has recently demonstrated the growth of Si-Ge axial NWs with abrupt heterojunctions [1], and simultaneous control of both material composition and doping profiles. This advance allows for the integration of Ge with Si in a hetero-NW structure for broad-spectrum and high absorption efficiency solar cells. Our preliminary optical measurements on p-Ge/i-Si/$n-$Si wires provide important ingredients for a hetero-NW photovoltaic device. We achieved good rectification with $\sim 10^3$ ratio between forward and reverse bias currents at moderate voltage. Under laser illumination (532 nm), we measured a large open circuit voltage $V_{OC} \sim 0.54$ V and a high short-circuit current density $J_{SC} \sim 4\text{x}10^3 \text{A/cm}^2$, comparable to state-of-the-art reported single NW results [2]. Additional optimization of separate Ge and Si *pin* NW structures and their integration in a combined Ge/Si tandem hetero-NW solar cell will be reported.

[1] D. E. Perea *et al.*, *Nano Lett.* **11**, 3117 (2011).
[2] B. Tian *et al.*, *Chem. Soc. Rev.* **38**, 16 (2009).

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