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High registry semiconducting nanowire growth and fabrication of out-of-plane nanowire device arrays P. MANANDHAR, S.T. PICRAUX, Center for Integrated Nanotechnologies, LOS ALAMOS NATIONAL LABORATORY TEAM — We present results on the fabrication of out-of-plane nanowire devices from metal nanoparticle seeds, assembled with high registry using a combination of e-beam lithography and chemical recognition assembly. The registry of the nanoparticle seeds allows the growth of nanowires at predefined locations followed by fabrication of top electrodes using predesigned lithographic masks. This approach enables large scale device array fabrication, which has not yet been demonstrated in vertical device geometry. The nanowires were grown from Au seeds using the vapor-liquid-solid (VLS) method in a cold-wall low pressure CVD system with good control over epitaxy, morphology and doping. Out-of-plane devices were fabricated from the nanowires using post-growth processes including planarization after SiO_2 layer deposition. Due to the precision of location of the nanowires, top metal contacts on the nanowires were then deposited using lithographic techniques, introducing the possibility of addressing single or a group of nanowires. The electrical characterization of the devices indicated integrity of the nanowires during rigorous device fabrication process. We will discuss the device fabrication process along with results from the device characterization.

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