Single-crystalline rutile TiO\(_2\) nanowires by mass selected Ni catalyst: Synthesis and electrical properties MYUNG HWA KIM, CHRISTOPHER LARSON, JEONG MIN BACK, XIHONG CHEN, MARTIN MOSKOVITS, ALEC WODTKE, Department of Chemistry & Biochemistry, University of California at Santa Barbara — We present a novel method for growing high quality TiO\(_2\) nanowires using mass-selected Ni clusters of nanometer sizes produced by magnetron sputtering and also show their electric field-effect functions. Single-crystalline TiO\(_2\) nanowires(NWs) are grown by atmospheric pressure physical vapour deposition(APPVD) process, using TiO and Ti metal powders as a Ti source and Ni nanoparticles as a catalyst, respectively. For the TiO\(_2\) NWs growth, first, the Ti metal layer with a thickness of \(\sim\)50nm was then deposited on the SiO\(_2\)/Si substrate by the e-beam evaporation technique and subsequently, the mass selected Ni clusters by using magnetron sputtering source combined with a quadrupole mass filter was deposited onto the Ti layer. APPVD growth was then performed in a horizontal quartz tube furnace at 800\(^\circ\)C-950\(^\circ\)C by introducing high purity Ar carrier gas (99.999\%) with the flow rate of 300 sccm for 2 hours. The \(I - V\) curves are linear over the entire annealing temperature range at 200 \(\sim\)500\(^\circ\)C, showing that the electrodes form good ohmic contacts with the nanowires. The \(I\) vs \(V\) curves for various values of \(V_{SD}\) and gate dependent \(I - V\) curves of a TiO\(_2\) nanowire configured as a back-gated FET are also obtained and will be discussed.