Synthesis and characterization of superconducting, single-crystal Al nanowires using template based electrodeposition\textsuperscript{1} MEENAKSHI SINGH, JIAN WANG, MINGLIANG TIAN, Penn State University, ALEXIS PEREIRA, University of Puerto Rico Cayey, NITESH KUMAR, THOMAS MAL- LOUK, MOSES CHAN, Penn State University — Al nanowires (ANW) have been fabricated using template based electrodeposition at room temperature for the first time. An anhydrous electrolyte comprised of AlCl\textsubscript{3} and LiAlH\textsubscript{4} in tetrahydrofuran with a Pt anode and Ag cathode was used to electrodeposit Al in an anodic aluminum oxide template. X-ray diffraction and electron diffraction show that the ANW are single crystal with (110) as the growth direction. Transmission electron microscopy shows that the wires have uniform diameters with an oxidation layer a few nanometers thick around them. Four electrode transport measurements on a single 70 nm thick ANW have shown significant enhancement in the critical temperature and the critical field and decrease in the critical current density from the bulk value.

\textsuperscript{1}This work was supported by: Center for Nanoscale Science (Penn State MRSEC) funded by NSF, Grant No. DMR-0820404.