MECHANICAL POLISHING FOR OMVPE GROWN POLYCRYSTALLINE III-V PHOTOVOLATICS ON LOW-COST SUBSTRATES. ***M. Brindak,*** *C. Bailey, S. Hubbard, R. Raffaelle*, Nanopower Research Laboratories, L. Fritzemeier, Wakonda Technologies *mpb4266@rit.edu, rprsps@rit.edu.*

Results on the progress of polycrystalline III-V based photovoltaic devices grown by OMVPE on thin metallic foil substrates are discussed. State of the art solar cells such as the III-V triple-junction cells grown lattice-matched to monocrystalline Germanium (Ge) substrates; yielding 31% AM 0 efficiency. However due to the high cost of single crystal Germanium, research has headed towards using thin-film polycrystalline Germanium substrates deposited on robust lightweight metal foils with closely matched thermal expansion coefficients. Previous work has shown that OMVPE-grown devices can be created on polycrystalline Ge thin films deposited on metallic substrates using a recrystallization process. However, the metal foils used as substrates must be carefully prepared before Ge and III-V deposition can take place. In this work, 2" disks were cut out of a 10 mil thick sheet of Molybdenum by commercially performed Electrical Discharge Machining (EDM). After EDM, the wafers were polished both commercially and in-house using a step-down mechanical polishing process. It was determined that in order to produce >1 mm polycrystalline Germanium grain sizes and prevent alloying between the Molybdenum substrate and Germanium film, the substrate should be polished to a surface roughness value of ~50 nm RMS. Surface roughness analysis was performed using an optical interference profilometer on both the commercial and in-house polished Mo disks. An improvement of over 250 nm RMS (compared to as received EDM wafers) was obtained using in-house step-down mechanical polishing. This improvement in mechanical polishing can now be assimilated into the process of growing Ge thin films, recrystallization and subsequent III-V solar cells epitaxy on low-cost metal foil substrates.