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Structural and superconducting features of Tl-1223 prepared at ambient pressure[1] FNU SHIPRA, Vanderbilt University, Oak Ridge National Laboratory, ATHENA S SEFAT, Oak Ridge National Laboratory, JUAN C IDROBO, Oak Ridge National Laboratory, Vanderbilt University — Details of bulk preparation of $TlBa_2Ca_2Cu_3O_{9-\delta}$ (Tl-1223) superconductor at ambient pressure with the critical temperature (T_c) features under thermal-annealing conditions will be presented. The as-prepared Tl-1223 (T_c =106K) presents a significantly higher T_c =125K after annealing the polycrystalline material in either flowing Ar+4%H_2, or N_2. We further refined the average bulk structures using powder XRD data. Although Ar+4%H_2 annealed Tl-1223 shows an increased 'c' lattice parameter, it shrinks by 0.03% upon annealing under N_2. Due to such indeterminate conclusions on the average structural changes, local structures were investigated at using aberration-corrected scanning-transmission electron microscopy technique. Similar compositional changes in the atomic arrangements of both annealed-samples of Tl-1223 were detected in which the plane containing a Ca atomic layer gives a non-uniform contrast, due to substitution of some heavier Tl. We present extensive bulk properties summarized through temperature-dependent resistivity, and shielding and Meissner fractions of magnetic susceptibility results.

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