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Effects of pressure and disorder on superconductivity in $Tl_2Ba_2Ca_{n-1}Cu_nO_{2n+4+\delta}$ (n=2,3) JIAN-BO ZHANG, XIAO-JIA CHEN, Center for High Pressure Science and Technology Advanced Research, Shanghai 201203, China, VIKTOR STRUZHKIN, Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC 20015, U.S.A., WENGE YANG, HO-KWANG MAO, Center for High Pressure Science and Technology Advanced Research, Shanghai 201203, China, HAI-QING LIN, Beijing Computational Science Research Center, Beijing 100089, China, YONG-CHANG MA, School of Materials Science and Engineering, Tianjin University of Technology, Tianjin 300384, China, NAN-LIN WANG, International Center for Quantum Materials, School of Physics, Peking University, Beijing 100871, China — The structural, vibrational, and superconducting properties of nearly optimally doped $Tl_2Ba_2Ca_{n-1}Cu_nO_{2n+4+\delta}$ (n=2,3) single crystals are studied at high pressures. While the superconducting transition temperature T_c of the bilayer system exhibits a parabolic behavior with a maximum around an optimal pressure level, its increased path has a kink in the trilayer compound, indicating a joint effect from the inner CuO_2 plane. The latter is further supported by the appearance of the two additional Raman modes. At higher pressures, we observe the sudden increase of the full width at half maximum of some lattice modes as well as the anomaly of the lattice parameters at certain pressure. These together contribute the enhanced disorder and the T_c reduction accordingly. We thus are able to distinguish the contribution to T_c from the intrinsic pressure variables, disorder, and the CuO_2 plane number and type in this layered family.

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