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The Strain Derivatives of T_c in $HgBa_2CuO_{4+\delta}$: CuO_2 Plane Alone Is Not Enough SHIBING WANG, Stanford University, JIANBO ZHANG, South China University of Technology, XIAO-JIA CHEN, VIKTOR STRUZHKIN, Geophysical Laboratory, WOJCIECH TABIS, NEVEN BARISIC, MUN CHAN, CHELSEY DOROW, XUDONG ZHAO, MARTIN GREVEN, University of Minnesota, WENDY MAO, TED GEBALLE, Stanford University — The strain derivatives of T_c along the a and c axes have been determined for $HgBa_2CuO_{4+\delta}$ (Hg1201), the simplest monolayer cuprate with the highest T_c of all monolayer cuprates (T_c = 97 K at optimal doping). The underdoped compound with the initial T_c of 65 K has been studied as a function of pressure up to 20 GPa by magnetic susceptibility and X-ray diffraction (XRD). The observed linear increase in T_c with pressure is the same as previously been found for the optimally-doped compound. The above results have enabled the investigation of the origins of the significantly different T_c values of optimally doped Hg1201 and the well-studied compound $La_{2-x}Sr_xCuO_4$ (LSCO), the latter value of T_c = 40 K being only about 40% of the former. Hg1201 can have almost identical CuO_6 octahedra as LSCO if specifically strained. When the apical and in-plane CuO_2 distances are the same for the two compounds, a large discrepancy in their T_c remains. Differences in crystal structures and interactions involving the Hg-O charge reservoir layers of Hg1201 may be responsible for the different T_c values exhibited by the two compounds.

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