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Oxygen isotope effect in layered cuprate superconductors XIAOJIA CHEN, VIKTOR V. STRUZHKIN, ZHIGANG WU, RUSSELL J. HEMLEY, HO-KWANG MAO, Geophysical Laboratory, Carnegie Institution of Washington,Washington, DC 20015, USA, BING LIANG, Center for Superconductivity Research, University of Maryland, College Park, MD 20742, USA, CLEMENS ULRICH, CHENGTIAN LIN, Max-Planck-Institut für Festkörperforschung, D-70569 Stuttgart, Germany, HAI-QING LIN, Department of Physics, The Chinese University of Hong Kong, Hong Kong, China — The isotope effect has generally been believed to be important in providing information about the high-temperature superconductivity. We report systematic studies of the oxygen isotope effect in nearly optimally doped $Bi_2Sr_2Ca_{n-1}Cu_nO_{2n+4+\delta}$ (n=1,2,3) single crystals. We find that α decreases monotonically with increasing the number of CuO_2 layers in this series, which is considered as a result of the interlayer coupling effect. Our results suggest that a *d*-wave BCS equation with a phonon cutoff is able to provide a self-consistent explanation for both the Tc and α behaviors of cuprates covering the parameters of doping, CuO_2 layer, and compound. The proposed theoretical model is also used to predict the pressure dependence of the oxygen isotope exponent in the optimally doped $YBa_2Cu_3O_{7-\delta}$ based on our measured Tc and Raman data. We find that α decreases with increasing pressure and becomes negative at some pressure. Such prediction is waiting for direct isotope measurements under high pressures.

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