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High-pressure structural study of Ammonium Perchlorate[1] ELISSAIOS STAVROU, JOSEPH ZAUG, SORIN BASTEA, PAULIUS GRIVICKAS, Lawrence Livermore Natl Lab, ERAN GREENBERG, Center for Advanced Radiation Sources, MARTIN KUNZ, Lawrence Berkeley Laboratory — Ammonium perchlorate (AP) with the chemical formula NH_4ClO_4 is a powerful energetic oxidizer used as an ingredient in rocket propellants and explosive formulations. For this reason, its structural properties under extreme conditions have attracted considerable attention (M. Dunuwille et al., S. Hunter et al.). However, its structural properties under pressure are not completely understood. In addition to its importance as an energetic oxidizer, AP is one of the simplest supramolecular systems. Thus, a structural study of AP under pressure can provide crucial information in the context of the emerging field of high pressure supramolecular chemistry. Ammonium perchlorate has been studied using x-ray diffraction and Raman spectroscopy up to the record pressure of 40 GPa. The results reveal a pressure-induced first order phase transition at $\sim$4 GPa, in agreement with previous studies. However, preliminary analysis of our results contradicts with the previously proposed high-pressure phase, as determined by neutron diffraction. No further structural phase transitions have been observed up to the highest pressure of this study. Intermolecular bonding between NH_4 and ClO_4 ions will be discussed based on Raman spectroscopy measurements.

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