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Bulk modulus anomaly in RCoO3 (R=La, Pr, and Nd) J.-S. ZHOU, J.-Q. YAN, J.B. GOODENOUGH, Texas Materials Institute, University of Texas at Austin — The $RCoO_3$ family undergoes a transition from the low-spin state to a higher spin state with increasing temperature. The onset temperature for this thermally driven, progressive transition is 35 K for $LaCoO_3$; the onset temperature increases to 200K for $PrCoO_3$ and 300K for $NdCoO_3$. At room temperature the population of the low-spin state increases as the ionic size of rare earth reduces from La to Nd. High pressure stabilizes the low-spin state by enlarging the crystal field splitting. The structural study with more pressure sampling points in this work has given a more accurate V-P relationship for the $RCoO_3$ family. A linear fitting to the V-P relationship instead of the Birch-Murnaghan (B-M) equation with a parameter B'=4 as default has been obtained for $LaCoO_3$. The bulk modulus B is even lower than that reported previously. In contrast, $NdCoO_3$ shows a regular B by fitting the V-P curve with the B-M equation. The V-P curve of $PrCoO_3$ is irregular and has been explained in terms of both a pressure- induced spin-state transition and a structural transition from an orthorhombic to a rhombohedral phase.

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