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LPO and Perovskite-post-Perovskite phase transition of $CaIrO_3$ during deformation with the d-DIA: Implications for the D" layer

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The existence and the seismic properties of the D" layer have been explained by the occurrence of a $MgSiO_3$ post-perovskite structure (pPv) that forms at a pressure of approximately 125-130 GPa above the core-mantle boundary. However, the deformation-induced lattice-preferred-orientation (LPO) of the pPv phase is still controversial, since the extremely high pressure precludes the direct use of $MgSiO_3$ for controlled deformation experiments, and different analogue substances appear to yield different LPO for a given strain field. While diamond-anvil-cell (DAC) experiments with $MgGeO_3$ have been found to exhibit a (100) or (110) slip planes, controlled deformation experiments with $CaIrO_3$ resulted in a (010) slip plane with a [100] Burgers vector. The difference between both approaches was that the $CaIrO_3$ experiments were deformed from the start in the pPv field, while the DAC experiments started in the Pv field and crossed the pPv phase boundary during deformation. To see whether the differences in the LPO measurements result from these different conditions, we performed $CaIrO_3$ deformation experiments with the d-DIA in the Pv stability field and crossing the Pv-pPv stability field during deformation. $CaIrO_3$ Pv experiments were performed at 1450˚C and 1GPa with a strain rate varying between 10^{-3}-10^{-5} s^{-1}. Interestingly, only the high strain rate experiments resulted in a weak texture, thus suggesting diffusion accommodated grain boundary sliding as the dominant deformation mechanism. For investigating the Pv-pPv phase transition, the temperature was lowered to 1200˚C during deformation. The resulting samples consist of a mixture of pPv and metastable Pv. Relict Pv crystals often contain conjugate sets of polysynthetic twins that are oriented at ca. 45˚ to the axis of greatest shortening. Post-Perovskite appears to nucleate preferentially along these (110) twin planes. First LPO measurements of these samples suggest an orientation of the b-axis that differs from the sam-

ples that were only deformed in the pPv field. Thus, our results may help to distinguish between a deformation-LPO and a transition-LPO in pPv.