New lattice preferred orientation (LPO) of amphibole experimentally found in simple shear

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The lattice preferred orientation (LPO) of amphibole has a large effect on seismic anisotropy in the crust. Previous studies have reported four LPO types (I–IV) of amphibole, but the genesis of type IV LPO, which is characterized by [100] axes aligned in a girdle subnormal to the shear direction, is unknown. In this study, shear deformation experiments on amphibolite were conducted to find the genesis of type IV LPO at high pressure (0.5 GPa) and temperature (500–700 °C). The type IV LPO was found under high shear strain (γ > 3.0) and the sample exhibited grains in a range of sizes but generally smaller than the grain size of samples with lower shear strain. The seismic anisotropy of type IV LPO is lower than in types I-III. The weak seismic anisotropy of highly deformed amphibole could explain weak seismic anisotropy observed in the middle crust.