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Elastic Anisotropy and Auxetic Behavior in Minerals THOMAS DUFFY, Princeton University — The elastic properties of minerals are of fundamental importance for understanding thermodynamic and mechanical behavior as well as for interpretation of seismic data. In recent years, there has been renewed interest in novel aspects of single-crystal elastic behavior. A database of single-crystal elastic properties of minerals and related phases has been constructed in order to evaluate auxetic behavior among minerals at ambient conditions and at high P and T. Partially auxetic behavior (directions with negative Poisson's ratios) is common among minerals, especially among the quartz, rutile, calcite, spinel, and sphalerite structures. Auxetic behavior is most common in the cubic and trigonal systems and correlates strongly with the elastic anisotropy as measured by the universal anisotropy index. MgO provides a striking example of P-T tuning of auxeticity and anisotropy. The larger variation in elastic anisotropy of MgO from ambient P and 3000 K to ambient T and 250 GPa samples nearly the entire range of extrema in Poisson's ratio of cubic crystals. MgO is strongly auxetic along [110] at high temperatures.

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