

## **The elastic tensor of natural pyrope- almandine and “hydrospessartine”: A Brillouin scattering study**

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Garnets are important components of the lithosphere and upper mantle. Their elastic properties have been extensively investigated, and 38 tensors published. Inconsistencies between different results may be ascribed to the low-quality data of the investigated samples. We determined by Brillouin scattering the elastic tensor of three natural pyrope-almandine  $(\text{Mg,Fe})_3\text{Al}_2\text{Si}_3\text{O}_{12}$  and one natural “hydrospessartine”  $\text{Mn}_3\text{Al}_2[(\text{SiO}_4)_3(\text{OH,F})_4]$ . We characterized structure and chemical compositions of the samples by single crystal X-ray diffraction and electron microprobe, and estimated hydrogen content of “hydrospessartine” by Raman scattering confirming previous [1]. The tensors of the studied pyrope-almandine garnets are in marginal agreement with the extant data, with differences larger than the experimental uncertainties. To improve the consistency of the available data in this system, we recalculated all the densities from their composition [2]. This approach improved the r.m.s. disagreement for  $C_{11}$ ,  $C_{12}$  and  $C_{44}$  by 13 % in average. The elastic coefficients of “hydrospessartine” are in average 15% lower than the anhydrous phase. A simple scaling law based on the behaviour of grossular-hydrogrossular system reproduces our measurements close to their uncertainties. However, hydration increases the elastic anisotropy of spessartine opposite to grossular. This shows that the effects of H on garnets are complex.

[1] Boiocchi, M. et al. (2012) *Z. Kristallogr.*, 227, 385;

[2] Novak, G.A., Colville A.A. (1975) *Cordillera Sect. Southwest. Geol. Soc. Amer. Progr. abstr.*