

## Elasticity of the Composition Dependence of Diopside-Jadeite System and Single-Crystal Omphacite up to 18 GPa

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Single-crystal omphacite samples from a natural eclogite were double-side polished into pallets with thickness less than 15  $\mu\text{m}$ . We determined the face normal using X-ray diffraction experiments at GSECARS, Advanced Photon Source. The face normal of the polished surfaces have direction cosines of (-0.15162, -0.96906, 0.194749), (0.242074, 0.298736, -0.92312) and (0.65123, -0.75886, -0.005). Then we performed sound velocity measurements of the three samples up to 18 GPa under ambient temperature in the Brillouin spectroscopy laboratory at University of New Mexico. While conducting the measurements, two ruby spheres were placed around the sample as the pressure standard. Ne was used as pressure medium to avoid possible large deviatoric stress developed within the sample chamber. For each sample, compressional and shear velocities were measured at a minimum of 13 different Chi angles to avoid any asymmetrical effect in the measured Brillouin frequency shifts. The composition was determined by electron microprobe analysis, and normalizing the chemical analysis in terms of Di and Jd yielded a simplified composition of  $\text{Di}_{70.2}\text{Jd}_{29.8}$ . A least-squares fit of the velocity-pressure data to third-order finite strain equation gives  $K'_s=4.49(9)$ ,  $G'=1.58(3)$  with  $\rho_0=3.34(1)$   $\text{g}/\text{cm}^3$ ,  $K_s=122.6(6)$  GPa and  $G=73.7(3)$  GPa. This study provides the first high-pressure experimental values for the individual  $C_{ij}$ 's of omphacite. The composition dependence of elastic properties of the diopside-jadeite system has been analyzed showing that the diopside-jadeite solid solution system is close to ideal mixing.