THE GEODYNAMICS SEMINAR № 603

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Acoustic emission monitoring at high pressures using a broadband piezoelectric transducer combined with a D-DIA apparatus

It is well known that acoustic emissions (AEs), which are the elastic waves generated from the propagating crack tips, satisfy the same scaling relationship as natural earthquakes from the viewpoint of seismic moment and corner frequency, namely, AE is a g ood simulation of actual earthquake events. Frequencies of AE waveforms range from 100 kHz to 5 MHz, and thus broadband type AE sensors are required for seismological frequency analyses. On the other hand, use of prevalent resonant type AE sensors, which record a narrow frequency band, is limited to determination of the 1st arrival time and wave amplitudes. Because both number and size of AE sensors are strongly restricted in AE monitoring combined with a multianvil apparatus, AE monitoring using a broadband AE sensor has not been performed at high pressures. In this study, one of the six AE sensors used for the measurement is a broadband sensor, and the rest are resonant sensors . The AE measurement system can evaluate the frequency components of AE s as well as the seismic source position is devised. Cold pressing experiments on quartz bead samples (diameter: 3.0 mm; length: 4 mm) were carried out using a D DIA deformation apparatus installed at the GRC (max. approx. 3 GPa). As a result, the relatively strong AE frequency components measured were predominant in the low frequency band below 0.8 MHz. In the future, high temperature and high pressure experiments using olivine polycrystalline samples will be conducted to elucidate the mechanism of earthquake generation through the evaluation of AE frequency components.

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Keywords: 1. Acoustic Emission
2. Broadband type AE sensor
3. deformation DIA apparatus

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