不均一圧縮下で変化するハンレイ岩のセーベック係数

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Changes in Seebeck Coefficient of Gabbro Induced by Non-uniform Loading

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Hot point probe tests (hot probe: ˜150 deg.C, cold probe: ˜20 deg.C) were conducted to measure Seebeck coefficient of vacuum-dried gabbro blocks whose one end was subjected to uniaxial loading. In case of the sample #1, for example, Seebeck coefficient of the loaded volume decreased from ˜16 mV/deg.C to ˜15 mV/deg.C when loaded under the 50-MPa pressure, while the coefficient of the unloaded volume did not change remarkably (˜16 mV/deg.C) even when loaded. Other two samples (#2 and #3) indicated the same tendency. This meant that energy levels of accepters in the loaded volume shifted downward and the concentration of hole charge carriers increased there. The Fermi energy level in the loaded volume shifted downward and hole charge carriers diffused into the unloaded volume. As a result, the electric potential of the unloaded end became high relative to the loaded end, which has been confirmed actually in this study (˜100 mV under the 50-MPa pressure) and early laboratory experiments. Because this mechanism in the laboratory scale is expected to be universal in various types of rocks, similar electromotive force will have generated, for example, in the crusts of the Earth and Moon in which stress/strain changes statistically and dynamically accompanied with quakes and tides.