Structural and petrological studies of Nihonkoku mylonite, on the border of Niigata and Yamagata Prefectures, northeastern Japan.

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The Nihonkoku mylonite (Takahashi, 1998) is distributed around Mt. Nihonkoku, located at the border of Niigata and Yamagata prefectures. The Nihonkoku mylonite has been studied by Takahashi (1998), at the point of structural geology. The constituent rocks consist of biotite-muscovite schist of Jurassic sedimentary, and gneissiose biotite granodiorite, gneissiose biotite granite, gneissose hornblende-biotite granodiorite, and quartz diorite of Cretaceous plutonic origin (Takahashi, 1998; Tsuchiya et al., 1999). The Nihonkoku mylonite is a Cretaceous mylonitic belt, and the Nihonkoku-Miomote belt (Shimazu, 1964), in which the Nihonkoku mylonite is located, is considered to be a northern extension of the Tanagura Fracture Zone in terms of shear sense and timing of mylonitization (Koshiya, 1986; Takahashi, 1998). In the Tanagura Fracture Zone, the deformation conditions at the time of mylonitization are difficult to elucidate because the movement was overwritten after mylonitization by movements such as phyllitization and brittle fracture (Koshiya, 1986). On the other hand, in the Nihonkoku mylonite belt, the deformation structure when shear band was formed, has been preserved. Therefore, clarification of the deformation conditions of the Nihonkoku mylonite enable us to understand the deformation conditions of mylonitization in the Tanagura Fracture Zone. Moreover, there are other similar Cretaceous strike-slip mylonite zones in Northeast Japan, such as the Hatagawa Fracture Zone (e.g., Shigematsu et al., 2002; Tsurumi et al., 2003) and the Iragawa mylonite belt (e.g., Takahashi, 2001; Watanuki et al., 2017). We will be able to compare with such other Cretaceous strike-slip mylonite zones, by clarifying the deformation conditions of Nihonkoku mylonite.

In this study, we collected biotite-muscovite schist and gneissiose biotite granodiorite, which are the constituent rocks of the Nihonkoku mylonite, in the field, and estimated the deformation conditions using Scanning Electron Microscope (SEM) and Electron Backscatter Diffraction (EBSD) analysis. EBSD analysis was performed on dynamically recrystallized quartz grains in the rocks. As a result, we observed a clear lattice preferred orientation (LPO) pattern, indicating that the flow deformation was caused by dislocation creep. From the crystal orientation data obtained by EBSD analysis, the dominant slip systems of the dynamically recrystallized quartz grains are either rhomb <*a*> or prism <*a*> slip. The deformation temperature was estimated to be 673-723K, referring the previous studies (Takeshita, 1996; Okudaira and Shigematsu, 2012; Watanuki et al., 2017) that estimated deformation temperatures from dominant slip systems and LPO pattern. We also estimated the differential stress to be 62-114 MPa, using the recrystallized grain size piezometer for quartz (Stipp and Tullis, 2003). Then, we estimated the strain rate to be $3.3*10^{-12}$-$3.8*10^{-11}$ s^{-1}, using the flow law for dislocation creep of quartz (Hirth et al., 2001). Based on these data, we report on the deformation conditions of Nihonkoku mylonite.

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