# Frictional Characteristics of Cleaved Mica Surfaces and Theoretical Considerations of the Frictional Mechanism

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Friction among rocks and minerals is critical for understanding fault slip and landslide. The maximum and steady-state friction coefficients of common minerals of mica and clay minerals have lower friction coefficients relative to common rocks and minerals. The friction coefficients were reduced under the presence of adsorbed water.
Interlayer bonding energy (ILBE) of these layered minerals has been believed to have a linear relationship with the friction coefficients [1]. However, this linear relationship was not confirmed by recent shear experiments [2,3]. Reliable ILBEs derived by the first-principles electronic state calculations [4] revealed that the linear relationship is unclear for both experimental friction coefficients [1,2]. In this study, we tried to understand a factor controlling the friction of mica and clay minerals instead of the ILBE.
Double shear test of cleaved mica surfaces was conducted as a function of normal stress ranging from 5 to 60 MPa. The friction coefficient decreased with increasing normal stress. This behavior has been observed for the powder of mica and clay minerals [2], however, the mechanism is unclear. In this talk, we discuss the mechanism by comparing our results with previous powder experiments and by using the first-principles electronic state calculations.
References
[1] Moore, D.E. and Lockner, D.A. (2004) *J. Geophys. Res. -Solid Earth 109* B03401.
[2] Behnsen, J. and Faulkner, D.R. (2012) *J. Struct. Geol. 42*, 49-61.
[3] K. Kawai, Sakuma, H., Katayama, I., Tamura, K. (2015) *J. Geophys. Res. -Solid Earth 120* 6209-6218.
[4] H. Sakuma and Suehara, S. (2015) *J. Geophys. Res. -Solid Earth 120* 2212-2219.

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