Temperature dependency of strength of granite at high confining pressure and micromechanism

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Triaxial testing on dry Man-nari granite was conducted at a confining pressure of 1.5 GPa and temperature up to 873K with an average strain rate of 2x10e-6/s. The strength decreases with increasing temperature with a trend. The strength values between 473K and 533K, however, deviate from the trend and very low with a minimum at around 523K. The rock exhibited macroscopically brittle fracture behavior up to 803K. However, it deformed microscopically with several factors for crystal plasticity with increasing temperature. Micromechanical studies suggest that the unusual behavior of strength is caused by switching the dominating factors from the activation of crack groups to the inhibition of them and the dominance of crystal plasticity.