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The effect of high pressure on the density and viscosity of liquid sulfur KEN-ICHI FUNAKOSHI, AKIFUMI NOZAWA, Japan Synchrotron Radiation Research Institute, SPring-8 — Liquid sulfur has attracted attention because it is a complex system that exhibits anomalous properties such as density and viscosity with changes in temperature and pressure. Brazhkin et al. (1991) suggested a first-order liquid-liquid phase transition of liquid sulfur occurs at pressure around 8 GPa. However, no dramatic change accompanying the phase transition has been observed in the previous high pressure viscosity experiment, and this transition is still under debate (Terasaki et al. 2004). Recently, we designed a new method for measuring the density and viscosity of liquid at high pressure using synchrotron radiation and a multi-anvil press (Funakoshi et al. 2012). We successfully obtained the density and viscosity of liquid sulfur and determined the precise compression curve at pressures up to 11 GPa. The density of liquid sulfur showed a smoothly increase and no sharp changes with increasing pressure. This behavior indicates that the long polymeric chain structure of liquid sulfur is continuously compressed after the λ-transition. However, an abrupt increase in the viscosity was observed around 9 GPa. This remarkable change in the viscosity suggests that a second-order phase transition without structural changes may have occurred in the pressure range.

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