

Multiple probes of Sulphur at high-pressure and temperature conditions

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Sulphur is known to have one of the most complex phase diagrams of the elements, with many solid phases and several liquid phases reported in the region up to 30 GPa. The high temperature stability of these phases is poorly understood and the melting curve above 12 GPa is unknown. Different optical probes, including Raman, optical absorption, thermal emission and microscopy measurements, have been used on compressed sulphur samples in a diamond anvil cell combined with CO₂ and IR laser heating techniques and resistive heating to reach temperatures on the order of ~1500K. Pressures up to ~33 GPa have been used to investigate the phase diagram, with a focus on the vicinity of the melting curve. Phase changes have been identified via optical

observations, absorption changes, anomalies in laser power vs. temperature dependencies and Raman Stokes to anti-Stokes intensity ratio behaviour. These multiple probes have enabled further study of the phase diagram, looking at both solid and liquid phases.

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