

A Multiphase Equation of State for Ce

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We present the development of a multiphase equation of state (EOS) for Ce that includes five distinct phases, namely the γ , α , α' and ε solid phases, together with the liquid phase. The EOS has been constructed to provide a consistent thermodynamic description over a broad range of temperatures and pressures, and it reproduces a wide set of experimental and theoretical constraints. In particular, it captures the ambient thermal expansion behavior, static isothermal diamond-anvil-cell measurements, shock Hugoniot response, and shock melting behavior with high fidelity. In addition, it matches first-principles full-potential linear muffin-tin orbital (FPLMTO) calculations of compressibility beyond the experimentally accessible regime, thereby extending confidence in the model to higher pressures. The EOS further predicts a liquid-vapor critical point near 9000 K, offering insight into the expansion behavior of Ce.

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