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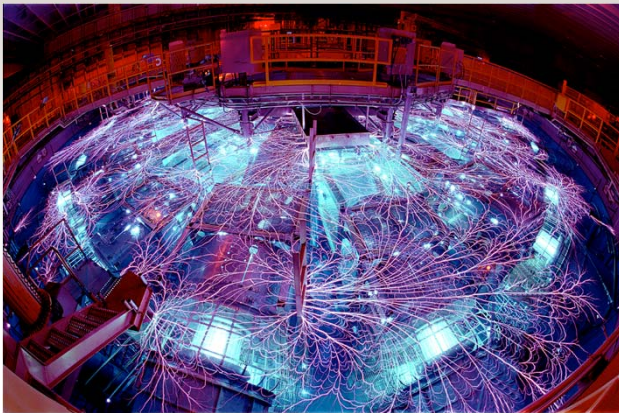
Reflectance thermometry in dynamic compression experiments

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The Sandia Z Machine (20+ MA pulsed power system)

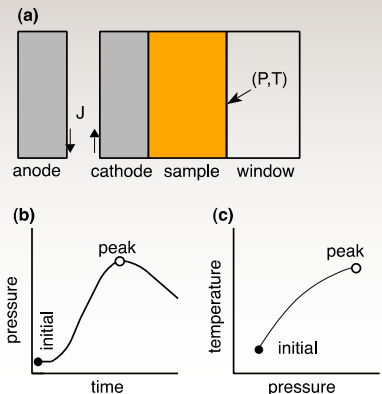


Ramp wave compression:

(a) Opposing currents generate intense magnetic repulsion

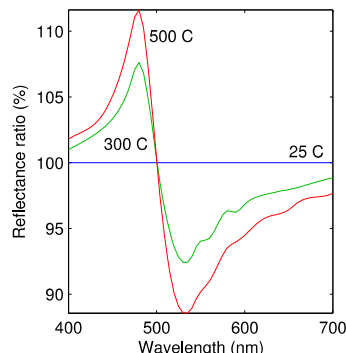
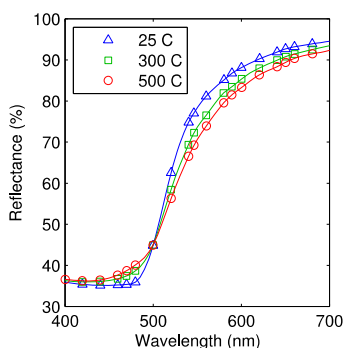
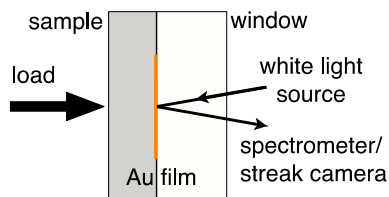
(b) The sample undergoes continuous compression from the ambient state to 10-100 GPa

(c) Quasi-isentropic loading results in modest temperatures (<1000 K) in 100-200 ns



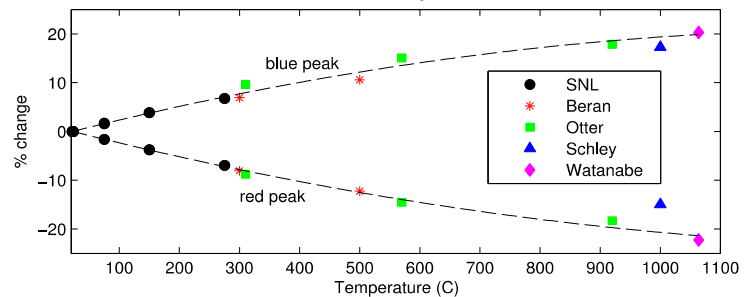
Reflectance thermometry:

- Gold reflectivity varies with wavelength and temperature
- Reflectance ratio increases in the blue, decreases in the red, with temperature
- Nanosecond measurements are possible with bright light source and streaked spectroscopy



Beran, A., *Tscherns Min. Petr. Mitt.* **34**, 211 (1985).

Reflectivity trends



Calibration issues:

- Sputtered gold films undergo irreversible changes after heating (0.5-1.0%)
- Annealing near/above the *highest* temperature reduces hysteresis below 0.2%
- Separating pressure from temperature in measured reflectivity is ongoing research

