**Ruby Fluorescence Pressure Scale – Key References**

**Non-Hydrostatic ruby scale**

Calibrated using shock data for several metals

MAO, HK; BELL, PM; SHANER, JW; STEINBERG, DJ. 1978. SPECIFIC VOLUME MEASUREMENTS OF CU, MO, PD, AND AG AND CALIBRATION OF RUBY R1 FLUORESCENCE PRESSURE GAUGE FROM 0.06 TO 1 MBAR. *JOURNAL OF APPLIED PHYSICS* 49 (6): 3276-3283.

**Quasi-Hydrostatic ruby scale**

Calibrated against shock data for Cu and Ag, Ar as pressure medium

MAO, HK; XU, J; BELL, PM. 1986. CALIBRATION OF THE RUBY PRESSURE GAUGE TO 800-KBAR UNDER QUASI-HYDROSTATIC CONDITIONS. *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH AND PLANETS* 91 (B5): 4673-4676.

**Effects of Non-Hydrostatic Stress**

Chai, M; Brown, JM. 1996. Effects of static non-hydrostatic stress on the R lines of ruby single crystals. *GEOPHYSICAL RESEARCH LETTERS* 23 (24): 3539-3542.

**Ruby scale at Mbar pressures**

-- new calibration at megabar conditions

Dewaele, A; Loubeyre, P; Mezouar, M. 2004. Equations of state of six metals above 94 GPa. *PHYSICAL REVIEW B* 70 (9): art. no.-094112.

--caveat: phase transition in Al2O3

Lin, JF; Degtyareva, O; Prewitt, CT; Dera, P; Sata, N; Gregoryanz, E; Mao, HK; Hemley, RJ. 2004. Crystal structure of a high-pressure/high-temperature phase of alumina by in situ X-ray diffraction. *NATURE MATERIALS* 3 (6): 389-393.

**Review and Summary articles**

Syassen, K. 2008. Ruby under pressure. *HIGH PRESSURE RESEARCH* 28 (2): 75-126.

Miletich, R; Allan, DR; Kuhs, WF. 2000. High-pressure single-crystal techniques. *HIGH-TEMPERATURE AND HIGH-PRESSURE CRYSTAL CHEMISTRY* 41: 445-519..

**Specifics on optimized Ruby properties**

Ruby spheres, Cr3+ concentration, annealing, etc.

Chervin, JC; Canny, B; Mancinelli, M. 2002. Ruby-spheres as pressure gauge for optically transparent high pressure cells. *HIGH PRESSURE RESEARCH* 21 (6): 305-314.

**Effect of Temp on Ruby Fluorescence**

RAGAN, DD; GUSTAVSEN, R; SCHIFERL, D. 1992. CALIBRATION OF THE RUBY R(1) AND R(2) FLUORESCENCE SHIFTS AS A FUNCTION OF TEMPERATURE FROM 0 TO 600-K. *JOURNAL OF APPLIED PHYSICS* 72 (12): 5539-5544..

**Alternative Optical Standards**

Especially suited for High T studies

e.g. SrB4O7: Sm2+; Sm-YAG, Raman standards

Datchi, F; Dewaele, A; Loubeyre, P; Letoullec, R; Le Godec, Y; Canny, B. 2007. Optical pressure sensors for high-pressure-high-temperature studies in a diamond anvil cell. *HIGH PRESSURE RESEARCH* 27 (4): 447-463.

**Historical**

PIERMARINI, GJ; BLOCK, S; BARNETT, JD; FORMAN, RA. 1975. CALIBRATION OF PRESSURE-DEPENDENCE OF R1 RUBY FLUORESCENCE LINE TO 195 KBAR. *JOURNAL OF APPLIED PHYSICS* 46 (6): 2774-2780

BARNETT, JD; BLOCK, S; PIERMARI.GJ. 1973. OPTICAL FLUORESCENCE SYSTEM FOR QUANTITATIVE PRESSURE MEASUREMENT IN DIAMOND-ANVIL CELL. *REVIEW OF SCIENTIFIC INSTRUMENTS* 44 (1): 1-9.

**Some Detailed Physics**

EGGERT, JH; GOETTEL, KA; SILVERA, IF. 1989. RUBY AT HIGH-PRESSURE .1. OPTICAL-LINE SHIFTS TO 156-GPA. *PHYSICAL REVIEW B* 40 (8): 5724-5732.

EGGERT, JH; GOETTEL, KA; SILVERA, IF. 1989. RUBY AT HIGH-PRESSURE .2. FLUORESCENCE LIFETIME OF THE R-LINE TO 130 GPA. *PHYSICAL REVIEW B* 40 (8): 5733-5738.