LOS ANGELES AT CHICAGO. P. H. Warren, James P. Greenwood and Alan E. Rubin, Institute of Geophysics, UCLA, Los Angeles, CA 90095-1567, pwarren@UCLA.edu.

Los Angeles is a recently discovered martian meteorite that is the most extremely differentiated (ferroan, incompatible element-rich) member of the basaltic shergottites [1]. The pyroxene crystallization trend starts at compositions (~$En_{50}Wo_{12}$ and $En_{39}Wo_{38}$) considerably more ferroan than in the other martian basalts. The nearest precedent is QUE94201, but geochemically QUE94201 (along with EET79001-b) appears “depleted” and thus totally unrelated to more “normal” basaltic shergottites like Los Angeles, Shergotty and Zagami [2]. Besides being more ferroan, the first pyroxenes in Los Angeles are a mélange of augite and pigeonite, sometimes intergrown, whereas the earliest QUE94201 pyroxenes are pigeonites, mantled by augite. The pyroxene trends in Shergotty and Zagami also feature both augite and pigeonite as early crystallization products, but as discrete grains of augite and pigeonite and stronger bimodality of Wo than in the case of Los Angeles’ pyroxenes. In Los Angeles, it appears that the early mixed pigeonite/augite pyroxenes were mantled by mainly pigeonitic intermediate-*mg* materials, along a broad trend that evolved toward approximately En_5Wo_{13}. There is a scarcity of pyroxenes, almost a compositional gap, at En ~20 ± 5 mol%.

The late stages of crystallization of Los Angeles were exceedingly complex. Cooling was slower than for Shergotty and Zagami. One result of this slow cooling is that pyroxene in Los Angeles has relatively thick (commonly 0.7–4 µm) exsolution lamellae. Another is the great abundance of pyroxferroite breakdown material (PBM, fine grained intergrowths of hedenbergitic pyroxene, fayalite, and a silica phase), especially in Los Angeles Stone 2. A rare fault extends through an area of PBM, so it probably formed as a result of re-equilibration during cooling [4], not shock metamorphism. Pyroxenes within PBM regions are distinctly Wo-rich compared to late-stage pyroxenes not intergrown with fayalite and silica, but show considerable range in mg (~En5–15). The PBM assemblage may have formed, locally, direct from melt. In one area, two extremely low-*mg* pigeonites, one of which is loaded with pyrrhotite inclusions, are separated by an apparent vein of PBM. Opaque oxide compositions also suggest a low equilibration temperature at an oxygen fugacity near the fayalite-magnetite-quartz buffer. Some of the plagioclase (coarse maskelynite, not mesostasis) exhibits disequilibrium “ternary” compositions, although normal shergottitic plagioclase compositions ($An_{56-38}Ab_{43-56}Or_{1-7}$) are far more typical.

Among the earliest pyroxenes are some augitic ones that show unusually high Al contents (Al atoms per 6 O up to 0.073). The compositional distinctiveness of the early pyroxenes, and in particular the paucity of compositions at En ~20±5 mol%, suggest that the earliest pyroxenes may have been phenocrystic (formed at an earlier time and/or place, albeit most likely within the same lava flow) in relation to the parent melt for the remainder of the rock. In other words, the bulk composition of Los Angeles probably does not preserve that of any single parent melt.

References: [1] Rubin A. E. et al. (2000) *LPS. XXXI*. [2] Meyer C. (1998) *Mars Meteorite Compendium.*