EFFECT OF MELT TIME AND PRECURSOR PHASES ON TYPE B CAI TEXTURES. *Susan V. Maharaj* and *Roger H. Hewins*, Dept. of Geological Sciences, Rutgers University, New Brunswick, NJ 08903, U.S.A.

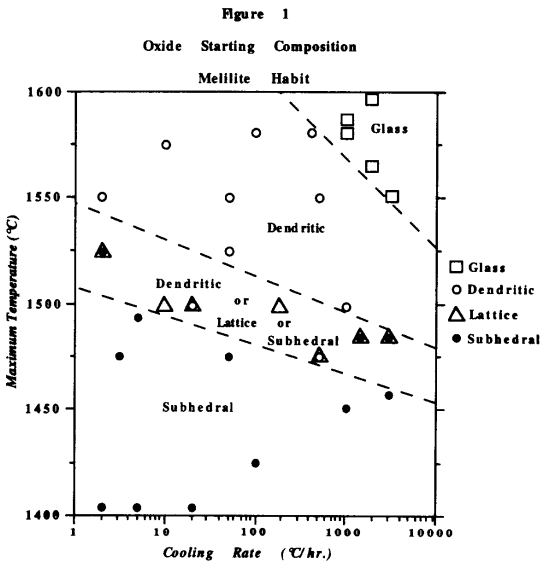
INTRODUCTION. Previous results of crystallization experiments on a Type B Ca-Al-rich inclusion (CAI) composition have shown that CAI textures can be reproduced by crystallization from partially molten droplets using a long melt time (i.e. 3 hrs) [1, 2] and a glass plus spinel starting composition [1]. Chondrule experiments indicate that short heating times and crystalline rather than glassy starting materials may make a big difference in the abundance of nuclei when cooling begins [3]. This study determines the effects of melt time and the nature of the starting material (oxides vs. silicates) as a function of maximum temperature (T_{max}) and cooling rate on the texture of an average Type B CAI composition.

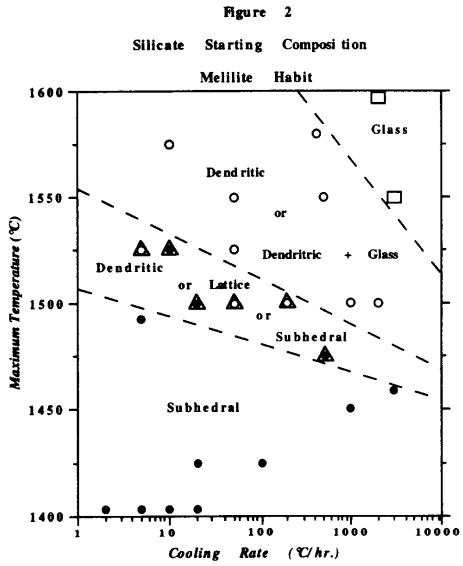
RESULTS AND DISCUSSION. Subhedral melilite is produced in flash heated (i.e. 1 min@T_{max}) experiments at temperatures ~100°C higher and cooling rates ~100-1000 times faster than when the total time at T_{max} is 3 hrs [4], using the oxide starting material. Anorthite did not nucleate in 3 hr long melt experiments at the temperatures and cooling rates used probably because of the destruction of nuclei during the duration at T_{max}. Stolper and Paque [1] have shown that anorthite may nucleate with 3 hr long melt times when lower initial temperatures are used.

Flash heated oxide and silicate starting compositions. Melilite habit as a function of maximum temperature and cooling rate for flash heated oxide and silicate starting compositions is shown in Figs. 1 and 2, respectively. The three boundary lines are nearly identical in both figures, indicating that there is virtually no difference if an oxide or silicate is making the liquid. Flash heated oxide starting composition experiments show anorthite is more common in charges with an initial T_{max} <1500°C (vs. >1500°C). Of the 19 charges run at ≤1460°C, 6 contain anorthite (or ~32%). Whether or not anorthite nucleates appears to be due to chance. In 8 pairs of duplicated experiments, one charge contains anorthite and the other does not. Flash heated silicate starting composition runs show anorthite is most common with initial temperatures ≤1500°C. 15 out of 15 samples (100%) run at T_{max} ≤1460°C contain anorthite. The chance effect of nucleation is still present but at higher initial temperatures than for the oxides and now in only 2 pairs of duplicated experiments, one charge contains anorthite and the other does not. No runs produce anorthite exactly like those found in natural CAIs. Even the closest match, which occurs in the lowest temperature, slowest cooled flash heated silicate charge, is still too skeletal (Fig. 3). The glass fields of figures 1 and 2 are probably drawn too large. The lower temperature runs within the glass fields were quenched at relatively high temperatures (1250-1300°C) in order to maintain the rapid cooling rates indicated. If cooling had continued to lower temperatures, it would have become non-linear. Lower quench temperatures, however, would have probably allowed dendritic melilite to nucleate, thus restricting the glass fields.

CONCLUSIONS. Flash heating a CAI composition reproduces subhedral melilite at higher temperatures and faster cooling rates than previously shown by [1]. Furthermore, anorthite is more likely to nucleate (with 100% efficiency in some cases) and to nucleate at higher temperatures if silicates rather than oxides are flash heated. However, if we add anorthite habit to the melilite criterion of [1] for reproduction of CAI textures, lower initial temperatures and cooling rates (or another factor altogether) are required.

REFERENCES. [1] Stolper E. and Paque J. M. (1986) *Geochim. Cosmochim. Acta* **50,** 1785-1806. [2] Maharaj S. V. and Hewins R. H. (1994) *LPS* **25,** 825-826. [3] Hewins R. H. and Connolly H. C. (1996) In *Chond. Protoplanet. Disk* (eds. R. H. Hewins et al.) Cambridge Univ. Press, 197-204. [4] Maharaj S. V. and Hewins R. H. (1995) *LPS* **26,** 883-884.





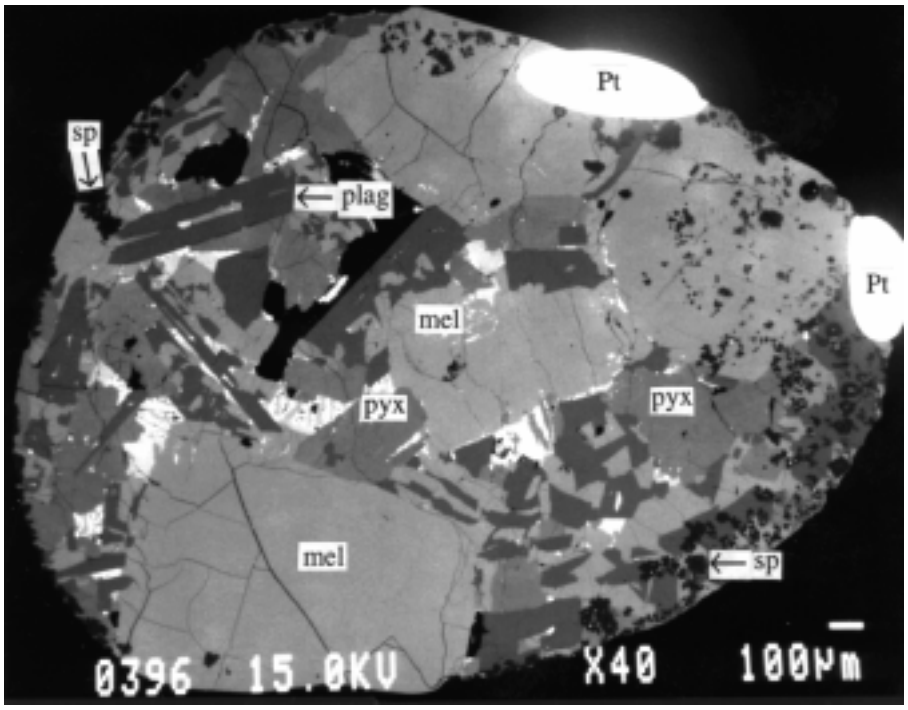


Fig. 3. Ca-Al-396 (T_{max} = 1405°, cool 2°C/hr); sp = spinel, mel = melilite, pyx = pyroxene, plag = plagioclase, Pt = Pt wire.