RW Smith, TMS Proceeding 1998

5. CONCLUSIONS

1) The solidification behaviour of the Ag-29.7% Cu alloy has been determined as a function of undercooling. At ?T = 65 K, an abrupt change in microstructure, primarily characterised by a tendency towards a random arrangement of spherical particles, was observed. This undercooling is near the $?T_0$ value for this alloy.
2) The results of the microgravity experiments show an increase in secondary arm spacing and coarseness. These results are consistent with an absence of buoyancy convection in microgravity. Thus, the equipment developed for this experiment provides a suitable system for the processing of undercooled droplet samples of relatively low-melting temperature alloys within the relatively short microgravity period provided by drop towers/shafts.

5 Conclusion

(1) The flux cleansing process, used to produce samples with significant amounts of undercooling, was found to be time-dependent.

(2) The solidification behaviour of the Ag-29.7at% Cu alloy has been determined as a function of undercooling. At $\Delta T = 65$ K, an abrupt change in microstructure, primarily characterised by a tendency towards a random arrangement of spherical particles, was observed. This undercooling is near the ΔT_0 value for this alloy, and it has been shown elsewhere that a change in the growth behaviour occurs at this undercooling. Growth modelling was used to show that solidification is partitionless beyond this undercooling.

(3) The results of the microgravity experiments suggest an increase in secondary arm spacing and coarseness. These results are consistent with an absence of buoyancy convection in microgravity. Thus, the equipment developed for this experiment appears to provide a suitable system for the processing of undercooled droplet samples within the relatively short microgravity period provided by drop towers.

Vekris et al. Acta Astronautica 1997