A MELT-DROP TECHNIQUE FOR THE PRODUCTION OF HIGH-PURITY METAL POWDER

F. Aldinger, E. Linck, and N. Claussen,
Max-Planck-Institut für Metallforschung
Institut für Werkstoffwissenschaften
7000 Stuttgart 80, West Germany

INTRODUCTION

The production of high-purity powders of metals and alloys such as beryllium, titanium alloys, or superalloys is still a problem. Oxidation of these materials cannot be avoided. Oxidation occurs in inert gases and even in reducing atmospheres when any gas impurities are present. Therefore, the powder production of these materials has to be performed either in high vacuum or at least in a static atmosphere of inert gas purified immediately before coming into contact with the disintegrating material. These requirements are very well met by the melt-drop technique presented in this paper, especially for coarse powders which must not necessarily be cold-workable. This is true, for example, for superalloys where high-temperature applications require large grain sizes; or in titanium alloys because the final microstructure will be achieved by a thermomechanical treatment. In the case of beryllium and beryllium alloys, where grain sizes < 5 μm are desired, further milling is necessary. But the melt-drop technique offers a simple and clean method directly from the purifying process of vacuum melting.

In melt-drop processes a liquid metal flows through a nozzle at the bottom of a crucible or the melt is just poured through a sieve. The latter process is rather old. It was used over centuries for the production of shotgun pellets. Beside this antique application, only a special type