

ABSTRACT

“CASTING IRON BASED SPECIALITY ALLOY”

A process for producing an iron based specialty alloy intermediate product, which method comprises: (a) forming a melt of desired alloy composition; and (b) casting the melt under solidification conditions to produce an iron based specialty alloy intermediate product that has a microstructure and other properties that renders it suitable for a finishing operation. The solidification conditions are selected and controlled to produce in the intermediate product a relatively fine microstructure and to minimise or avoid macro segregation of alloy components and surface oxidation and cracks. The finishing operations can be typical metal working operations such as cold rolling, hot rolling, annealing. Preferably the melt is cast as a thin section, strip, foil or wire of thickness about 2 mm or less. Generally, the properties of iron based specialty alloys are attributable to the inclusion of relatively high proportions of alloying element levels, e.g. and/or Cr, Ni, Cu, Si, Al and the remainder Fe.

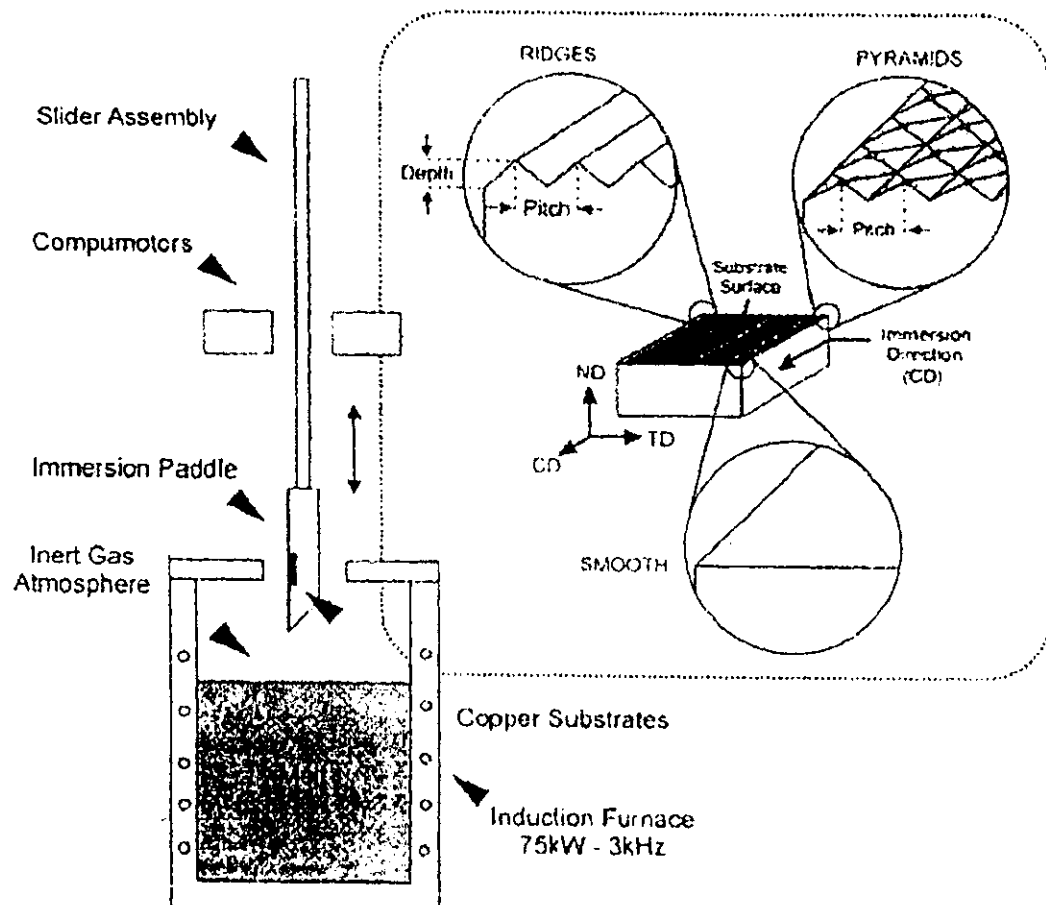


Figure 1: Schematic diagram of a typical dipping/immersion apparatus showing the furnace/melt and the paddle arrangement containing substrates. The insert shows different types of substrate surface topography used in other studies (Note: only a smooth substrate was used during the present experiments).

H. Subramaniam
(H. SUBRAMANIAM)
of SUBRAMANIAM & ASSOCIATES
Attorneys for the applicants

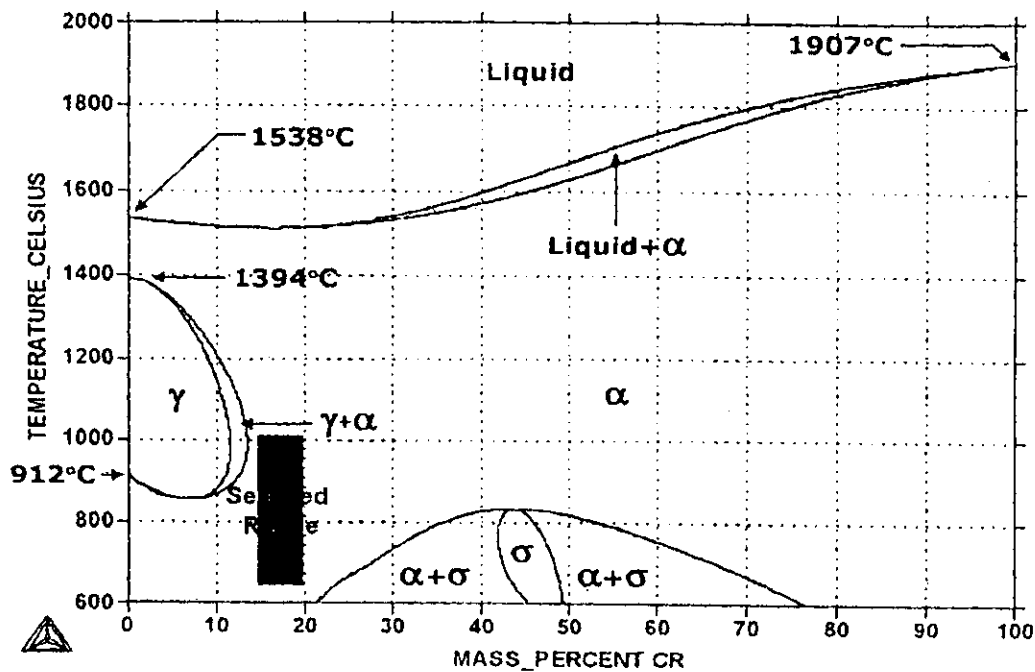


Figure 2: Fe-Cr Phase Diagram

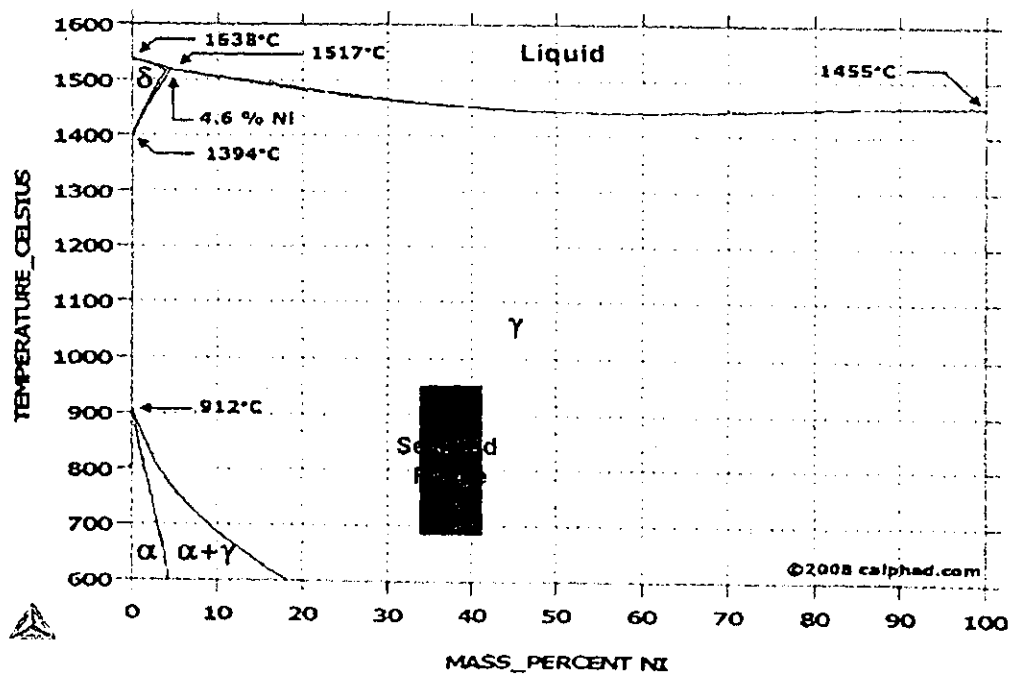


Figure 3: Fe-Ni Phase Diagram

[Signature]
(H. SUBRAMANIAM)
of SUBRAMANIAM & ASSOCIATES
Attorneys for the applicants

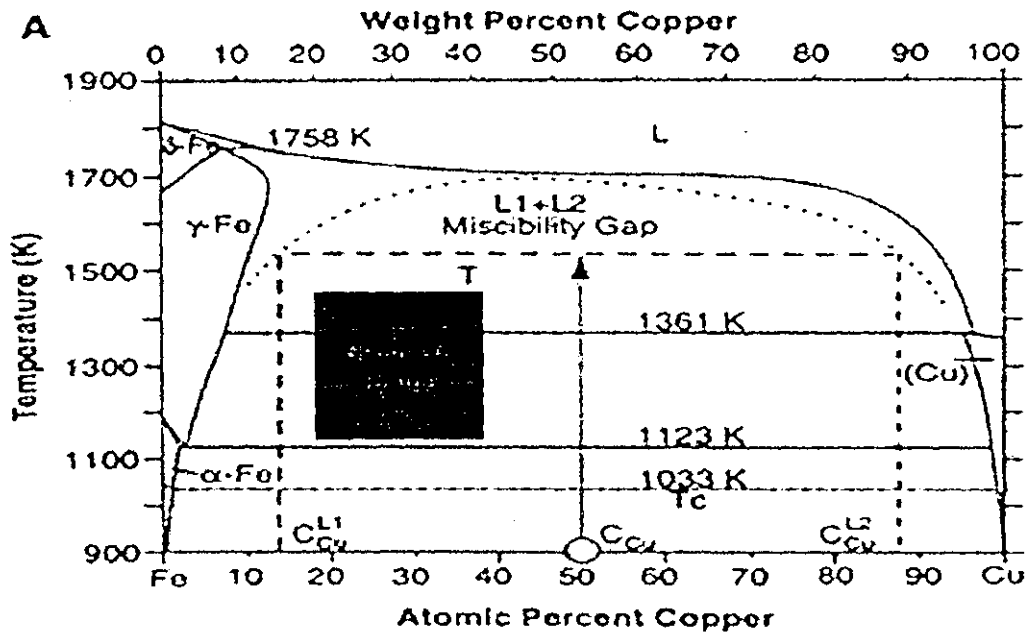


Figure 4: Fe-Cu Phase Diagram

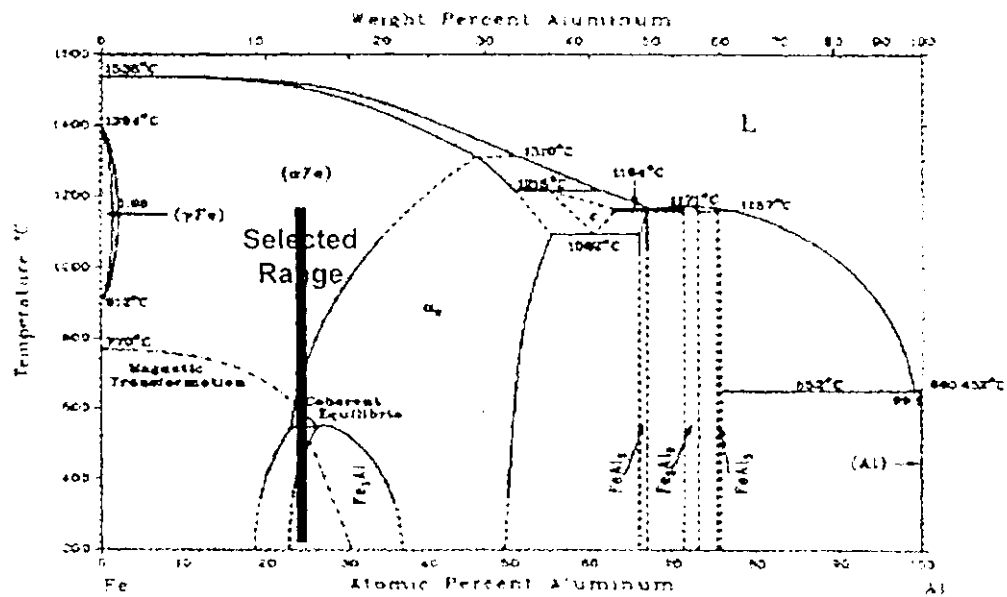


Figure 5: Fe-Al Phase Diagram

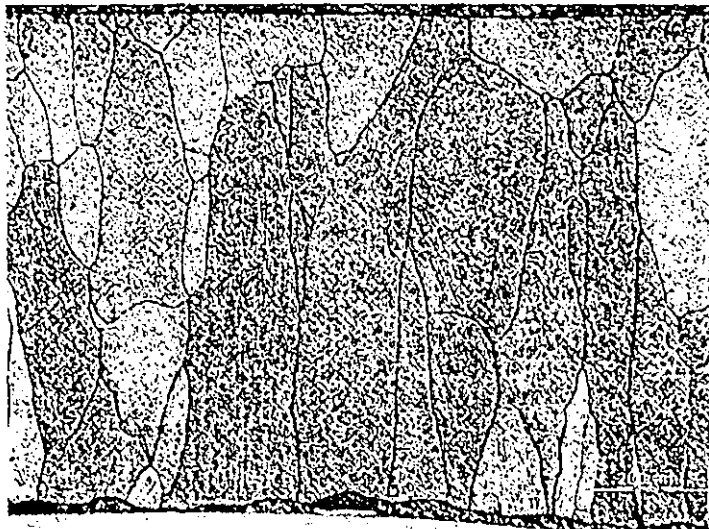


Figure 6 – Cast Microstructure (Fe-Cr-Al)

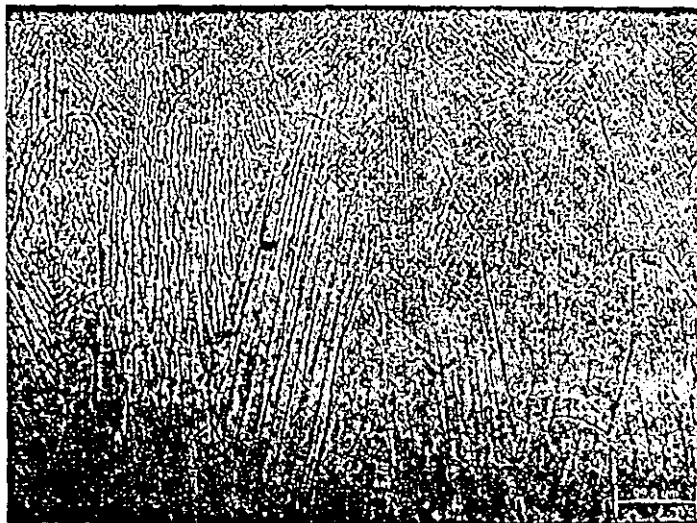


Figure 7 – Cast Microstructure (Fe-Ni)



Figure 8 – Cast Microstructure (Fe-Cu-Cr)

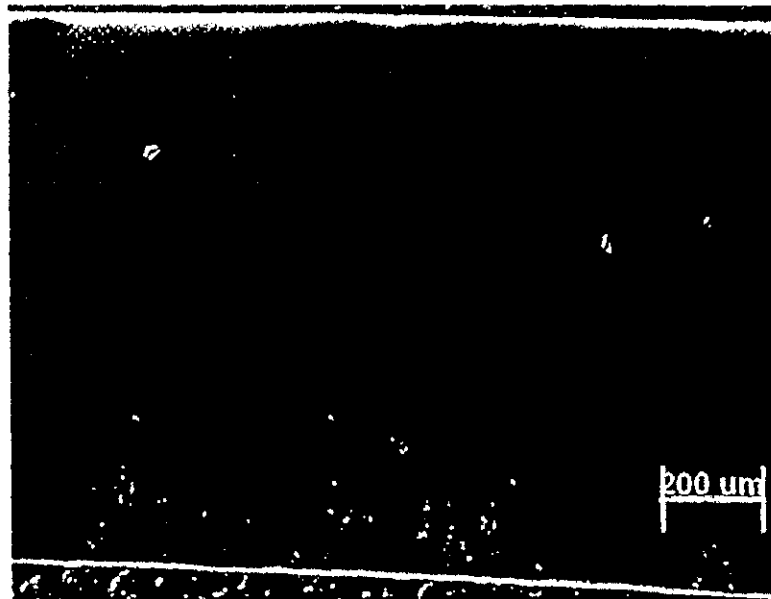


Figure 9 – Cast Microstructure (Fe-Al-Cr)

(H. Subramaniam)
(H. SUBRAMANIAM)
of SUBRAMANIAM & ASSOCIATES
Attorneys for the applicants

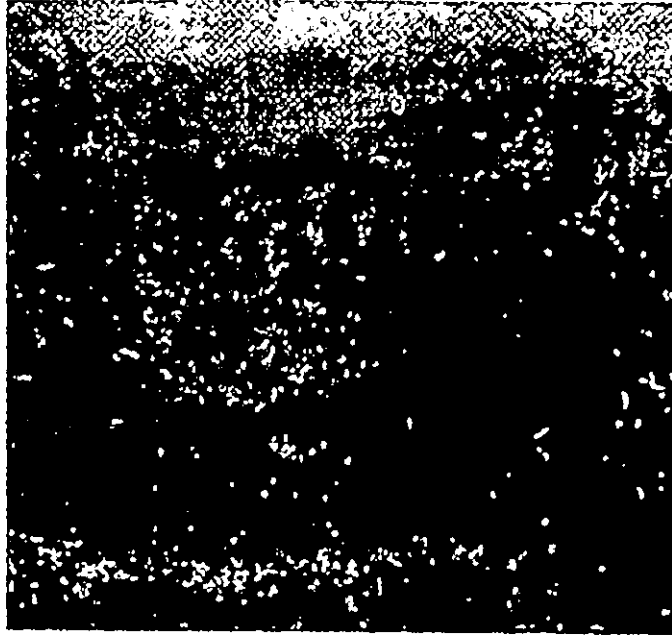


Figure 10 – Cast Sample (Fe-Ni)



Figure 11 - Cold Rolled and Annealed Sample (Fe-Ni)

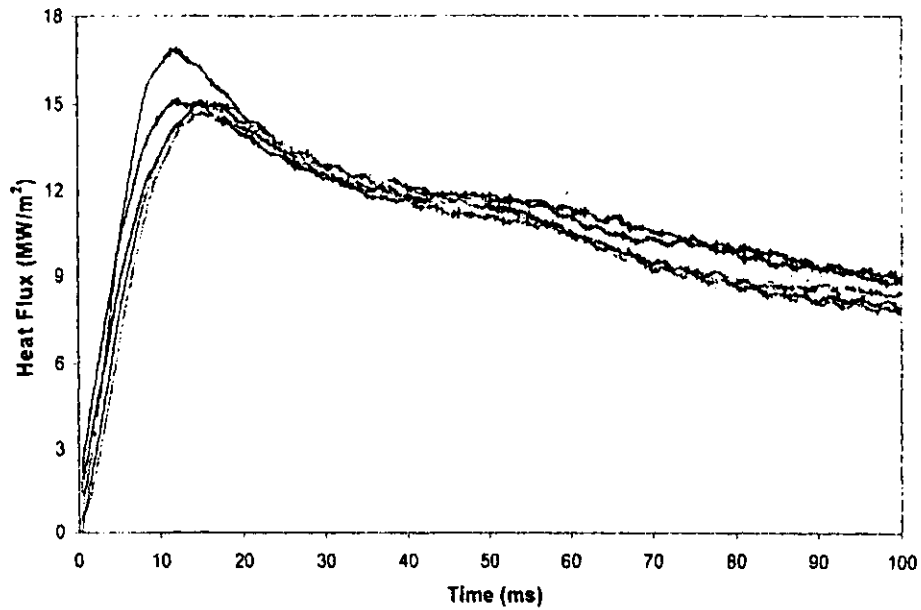


Figure 12 – Heat Flux Curves (Fe-Ni)

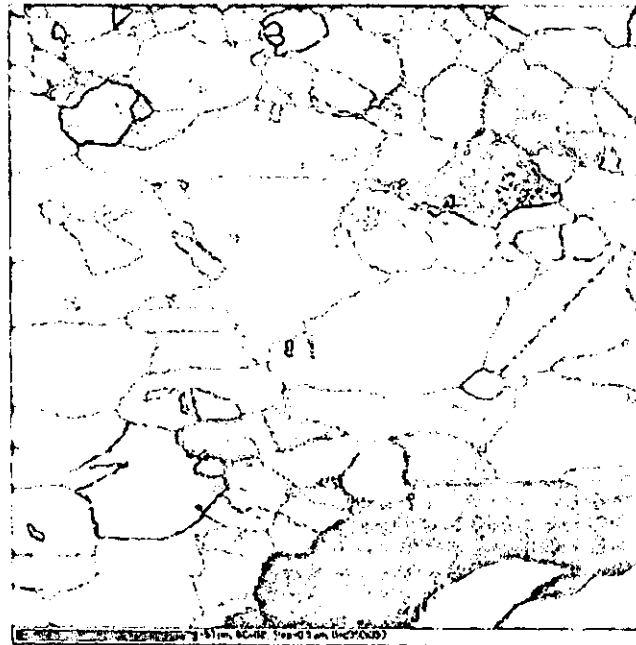


Figure 13 - Cold Rolled and Annealed Microstructure – 14 µm Grain Size (Fe-Ni)

(H. SUBRAMANIAM)
of SUBRAMANIAM & ASSOCIATES
Attorneys for the applicants