Title: A STUDY OF THE PRECIPITATION OF δ IN A SERIES OF ALLOYS DERIVED FROM 718 IN WHICH THE PRECIPITATES TAKE A SUBCOMPACT MORPHOLOGY

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Abstract: A fundamental limitation of alloy 718 is that the coherent γ'' precipitates that impart strengthening are metastable with respect to the formation of δ - orthorhombic Ni₃Nb in the form of partially coherent Widmanstätten plates. Although the literature suggests that the δ may nucleate at overaged γ'' particles, extensive observations on a series of alloys derived from 718 show that essentially all δ plates can be traced to grain boundaries or twin interfaces. Once δ nucleates at a grain (or twin) boundary, it propagates and branches across entire grains by repeated re-nucleation on itself. These results suggest that δ formation may best be forestalled by modifications of the grain boundaries, rather than by reducing the rate of γ'' coarsening.