Solidification paths in modified Inconel 625 weld overlay material

Inconel 625 is commonly used for overlay welding to protect the base metal against high temperature corrosion. The efficiency of corrosion protection depends on effective mixing of the overlay weld with the base metal and the subsequent segregation of alloy elements during solidification. Metallographic analysis of solidified samples of Inconel 625 with addition of selected elements is compared with thermodynamic modelling of segregation during solidification. The influence of changes in the melt chemistry on the formation of intermetallic phases during solidification is shown. In particular, focus is put on how the composition of the dendrite core is affected by modifications to the alloy. It has previously been shown that when the overlay material corrodes, the corrosion take place in the dendrite core. Therefore, the discussion will be directed towards explaining the extent to which the variations in chemical compositions influence the composition of the dendrite core of the weld overlay.