yet. Whereas, at 1450 and 1500°C no B_2O_3 is observed and the only impurity seen is C. This indicates that at 1450°C and higher temperatures the reaction is completed. From the SEM patterns it can be seen that the shape of the particles is somewhat between spherical and elliptical. The free carbon and particle size of the product were analyzed.

Microstructure and Phase Transformation in Aged Nickel Rich Ni-Ti Alloy Using TEM Electron Microscope

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Microstructure and shape memory properties due to the formation of a rhombohedral phase (R-phase) formation in nickel rich binary Ni-Ti alloy containing 50.23 atom% Ni were investigated in this research. After annealing, the samples were aged for 1, 5 and 7 hours at 773K. Microscopic studies revealed that the rhombohedral phase heterogeneously nucleated and then grew within the regions near the grain boundaries of the alloy. It was also observed that the amount of this phase increased with the ageing time. Microstructural TEM observations indicated that a considerable number of dislocations were simultaneously produced during the R-phase formation as a result of the ageing process. It was, therefore, suggested that the formation of the R-phase regions was related to the presence of the stress fields produced around the dislocations. With increasing of these strain fields, possibility of direct austenite to martensite transformation apparently reduced; while the formation of the intermediate R-phase regions grew. A diverse new set of twins and self accommodated twin envelops were observed in martensitic microstructure of the samples together with the pseudo-stable R-phase regions.

Effect of Bainitic Microstructure on Mechanical Properties of Microalloyed Cast Steels

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The effect of bainitic microstructure obtained from austempering on mechanical properties of a series of microalloyed cast steels containing Ti-V-B and V-only in comparison with base composition is investigated. The use of microalloyed wrought steels is widespread throughout the construction industry. However, the use of microalloys to increase the strength of low-carbon content cast steels, without significant reductions in toughness or weldability, is still in its infancy.

For the wrought microalloyed steels, excellent toughness and weldability are achieved by lowering the carbon content. Strength is maintained by adding small amounts of microalloying elements (usually vanadium, titanium and niobium) that precipitation strengthen the material during thermo-mechanical processing. Similar demands for low-cost, higher-strength steel casting with good toughness and weldability indicate a wide range of potential applications where microalloyed cast steels may be appropriate. Although these overseas experiences with these new materials have been reported, detailed information on the alloying and processing variables affecting mechanical properties is not available. The physical metallurgy principles governing the production of cast and wrought microalloyed steels are similar; however, significant differences can be expected in the final compositions, microstructure and processing.

In this paper, two different alloys of microalloyed cast steels and a base composition were prepared and effect of produced microstructures by austempering on mechanical properties was evaluated. The samples were austempered at 370, 410 and 450 °C for 5, 100, 300, 600, 900, 1200 and 1500 s. Results indicated that the hardness, strength decrease and toughness, elongation increase with increasing austempering temperature respectively. Also the hardness, strength decrease and toughness, elongation increase with increasing austempering time respectively. A good combination of strength and toughness is achieved by developing a microstructure of martensite and bainite.