

Wire Intercalated Compounds of AlTi₃ and Fe₂Ti Obtained by Decomposition of Intermetallic Al₄₅Ti₃₅Fe₂₀ Alloy

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A two step preparation method of intermetallic core shell wires is presented in this work. The method consist of production by mechanical alloying of an intermetallic alloy of Al₄₅Ti₃₅Fe₂₀. Milled powders were characterized by X-ray diffraction (XRD). This characterization shown that after 300 hours of milling of elementary powders of Al, Ti and Fe formed two phases AlTi₃ and Fe₃Al. The second step was a sintering of the powders at 300MPa/min was applied ,with a heat treatment for 1 hr at 900°C.

After this procedure by XRD it was possible to identify several intermetallic phases; Al₃Ti_{0.75}Fe_{0.25} ,Al₃Ti , FeTi, AlTi₃, Ti₉Al₂₃, Fe₂Ti , Al₈₆Fe₁₄ y Al_{0.4} Fe_{0.6}. The appearance of this phases is due to a decomposition phenomena during the sintering and heat treatment.

We found a large number of hexagonal wires and a thin foils with different composition using Scanning Electron Microscopy and Energy-dispersive X-ray spectroscopy (EDS).

With the Focus Ion Beam (FIB) technique was prepared a sample to be observed by High Resolution Transmission Electron Microscopy (HRTEM). In the HRTEM analysis was detected a large number intercalation of two phases AlTi₃ and Fe₂Ti in wire form.

These intercalated wires have a potential application in electronics as a low cost quantum cascade dispositive.

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