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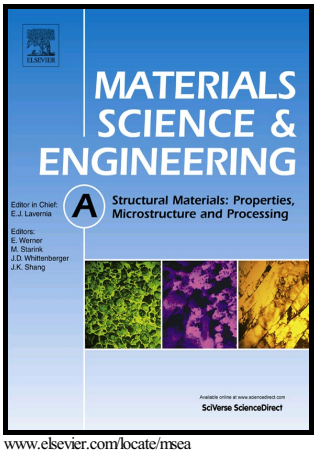

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The effects of thickness of original Ti foils on the microstructures and mechanical properties of Ti_2Ni/TiNi laminated composites.

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Abstract

Ti_2Ni/TiNi laminated composites with different TiNi volume fractions were fabricated by adjusting the thickness of initial Ti foils. The microstructure evolution was discussed. The compression properties and fracture toughness in different directions were systematically investigated. The results show that the formation of Ti_2Ni/TiNi laminated composites experiences a complex diffusion process between Ti and Ni atoms. TiNi layers in the composites possess a complex monoclinic B19′-type crystal structure and Ti_2Ni participates in the TiNi layers have a great effect on the ductility of the TiNi layers. The compression tests demonstrate that the compression strength and strain increase with the increase of the thickness of TiNi layers in both tested directions. The tests also reveal that whether the double yielding phenomenon can be obviously observed in compression curves is determined not only by martensitic re-orientation of TiNi layers, but also by the load distribution on different layers. The fracture toughness of the composites increases with increase of the thickness of TiNi layers in both orientations: in the divider orientation, it is related to the strength and ductility of TiNi layers; and in the arrester orientation, it is improved primarily through the mechanisms of crack bridging and deflection by TiNi layers.

Keyword: Ti_2Ni/TiNi, Laminated composite, Microstructure, Compression properties,