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Prof. Shampa Aich

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR, INDIA

MICROSTRUCTURE AND MAGNETIC PROPERTIES OF RAPIDLY SOLIDIFIED HEUSLER TYPE FERROMAGNETIC SHAPE MEMORY ALLOYS

Heusler Type Ferromagnetic Shape Memory Alloys (FMSMAs) are becoming much more promising magnetic smart materials in microactuations because of their high transformation temperature, low hysteresis loss, and low cost compared to the Fe-based FMSMAs. For a long time NiMnGa was the most promising Heusler composition in FMSMAs, because it has shown a proper martensitic transformation, a good shape memory effect and a decent magnetostrictive character. The recently discovered NiFeGa and CoNiGa alloy systems are the nice substitutions in the world of FMSMAs and are expected to show better and more attractive technological properties compared to NiMnGa alloy system because of their improved ductility with high transformation temperature, higher magnetization of the parent phase, and low cost . These alloys show magnetic transition as well as martensitic transformation at the same time and exhibit large magnetic field induced strain (MFIS), as high as ~ 10% due to rearrangement of martensitic variants. Rapid solidification helps to prevent the formation of γ phase which deteriorates the martensitic transformation. But at the same time due to formation of low fraction of γ phases the ductility deteriorates. This research reports about the microstructural developments and magnetic properties of a series of rapidly solidified NiFeGa(Al) and CoNiGa(Al) ferromagnetic Heusler alloys with substitution of high-cost Ga by relatively low-cost Al.

Friday, July 16, 2010
136 Jorgensen Hall
855 North 16th Street, UNL City Campus
2:30 p.m.

Host:
Prof. Jeff Shields
Department of Mechanical Engineering

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