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Transformation Temperatures and Electrochemical behavior of Polycrystalline Fe-Doped Ni-Mn-Ga and Co-Ni-Ga Alloys

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The effect of *Fe* addition on martensitic transformation temperatures and electrochemical behavior was studied in polycrystalline $Ni_{51.4}Mn_{24.8-x}Ga_{23.8}Fe_X$ alloys ($1<x<2.2$) and $Co_{38.3}Ni_{32.1}Ga_{29.6}$ as alternative to *Ni-Mn-Ga* alloys which are used as ferromagnetic shape memory alloys. The analysis of corrosion rates was conducted by cyclic polarization curves with potentiostat-galvanostat equipment. The corrosion morphologies were also analyzed by scanning electron microscopy (*SEM*). The kinetics of corrosion was found to decrease with increasing *Fe* content in the alloy, while the martensitic transformation temperatures increased with increasing *Fe* content. The $Co_{38.3}Ni_{32.1}Ga_{29.6}$ alloy shows i_{corr} lower than the *Ni-Mn-Ga* alloy. From results, the studied alloys exhibited a general dissolution in the anodic branch where a spontaneous passive zone occurred at certain potential and some elements like Co, Mn and also Ni were present in a higher percentage in corrosion deposits.

Keywords: shape memory alloys, polarization curves, polycrystalline, corrosion, calorimetry, morphology.

FULL TEXT