

Abstract of the Disclosure

A process for producing nanocrystalline materials, and in particular nanocrystalline nickel having an average grain size of less than about 11 nanometers and ternary and quaternary nickel-iron alloys, such as NiFeCr and NiFeCrMn alloys, having a grain size less than about 100 nm is described. The nanocrystalline nickel is electrodeposited onto the cathode in an aqueous acidic electrolytic cell by application of a pulsed D.C. current. The ternary and quaternary Nickel-Iron alloys and other binary, ternary and quaternary alloys may be produced by D.C. electroplating or by pulsed D.C. electroplating. The cell electrolyte also contains a stress reliever, such as saccharin, which helps to control the grain size. The novel products of the invention find utility as wear resistant coatings, hydrogen storage materials, magnetic materials and as catalysts for hydrogen evolution.

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