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Fabrication of all-metal strained bimorphs by controlling the stress in titanium-tungsten sputtered thin films YEHYA SENOUSY, CINDY HARNETT, University of Louisville — The strain architecture technique has been used recently to fabricate out-of-plane micro and nanostructures. Applications of such structures include actuators and microcoils for antenna applications. These free standing structures have been fabricated using bilayer films with strain mismatch. Materials used for the bilayer films included GaAs/InGaAs, Si/SiGe and oxide/metal layers. In this paper, we introduce a new fabrication method for these out-of-plane microcoils. The method depends on obtaining a bilayer film by controlling the stress in titanium-tungsten (TiW, 10 wt.% Ti) thin films deposited under two different conditions. The stress control is achieved by varying the pressure of the argon gas during sputtering. The stress of the majority of metal films sputtered is tensile including TiW. As the pressure of the argon gas decreases, an increase in “atomic peening” increases the compressive stress in the TiW film. This characteristic of TiW allows the use of different substrates, like silicon, glass, GaAs and plastics, to obtain free standing and out-of-plane structures.

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