

Structural and morphological characterization of electrodeposited CoWP thin films

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CoWP films were electrodeposited on copper-coated silicon wafers from citrate electrolytes containing cobalt sulphate, sodium tungstate and sodium hypophosphite under various deposition conditions and characterizations of the films were carried out using various instrumental techniques. Composition analyses showed that the surfaces of the films contained large amounts of oxides and hydroxide of tungsten and cobalt, respectively. An AES depth-profile, however, revealed that the bulk of the films consisted of Co, W and P. Microstructural analyses showed that CoWP films could be amorphous, polycrystalline and crystalline. Amorphous films were obtained when deposited at higher applied potential and current density or the films contained high amount of phosphorus and/or tungsten, while films deposited by very low applied potential and current density were crystalline with a preferred orientation of [002] of hexagonal cobalt. SEM images showed that the films deposited from neutral or acidic baths at room temperature had typical spherical nodular structures, while the films deposited from basic solution or at elevated temperature had needle-like crystallites.