Structural and electrical properties of nickel–iron thin film on copper substrate for dynamic random access memory applications

ABSTRACT

Using pulse electrodeposition technique, nano crystalline NiFe films were deposited on conductive copper substrates, under galvanostatic mode in an ultrasonic field at different conditions such as pulse current magnitude, deposition time and ultrasonic bath temperature. As-prepared NiFe/Cu thin films were characterized for phase analysis, surface morphology, surface roughness and resistivity measurements. The results show that the use of ultrasonic bath at room temperature has reduced the surface roughness, resistivity, average grain size and crystallite size of NiFe/Cu thin films. The resistivity is reduced with increasing deposition current from 44.2 μΩ cm at 40 mA to 33.0 μΩ cm at 100 mA. On the other hand, a significant drop of the resistivity from 35.7 to 9.4 μΩ cm is observed if the deposition time was reduced from 5 to 3 min.

Keyword: Pulse electrodeposition; NiFe/Cu thin films; Surface morphology; Surface roughness resistivity