

MICROSTRUCTURE AND EXCHANGE COUPLING PARAMETERS OF MTJ WITH CoFeB BOTTOM ELECTRODE

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In this study we report the relationship between texture degree of antiferromagnetic and ferromagnetic pinned bilayer induces by different seed-buffer layers, and the exchange bias and the interlayer-Néel coupling fields. MTJs with the structure: substrate Si(100)/SiO_x/buffer/IrMn/CoFeB/AlO_x/NiFe/Ta were deposited using two types buffers: Cu and Ta/Cu/Ta/Cu. Samples were annealed in vacuum at temperatures ranging from 150°C to 350°C. XRD analysis reveals that the texture of the sample with Cu buffer is characterized by lower texture degree than of the sample with Ta/Cu/Ta/Cu buffer. Major and minor hysteresis loops show that values of exchange bias and Néel coupling fields increase with increasing annealing temperature and are higher for the stronger textured samples. The texture of the IrMn increases slightly, while of the CoFeB increases significantly with the annealing temperature. The roughness, measured by AFM, depends on the type of the buffer and is higher for strong textured Ta/Cu/Ta/Cu buffer. The comparison of junctions with CoFe and CoFeB bottom electrode shows that addition of 5% B in CoFe layer makes the surface of pinned layer smoother. This leads to smaller Néel coupling field, which is desirable for application of MTJ in MRAM.

9.7 cm

13.4 cm

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