

TUNNELING MAGNETORESISTIVE (TMR) DEVICE WITH MgO TUNNELING BARRIER LAYER AND NITROGEN-CONTAINING LAYER FOR MINIMIZATION OF BORON DIFFUSION

ABSTRACT OF THE DISCLOSURE

A tunneling magnetoresistance (TMR) device, like a magnetic recording disk drive read head, has a nitrogen-containing layer between the MgO barrier layer and the free and/or reference ferromagnetic layers that contain boron. In one embodiment the free ferromagnetic layer includes a boron-containing layer and a trilayer nanolayer structure between the MgO barrier layer and the boron-containing layer. The trilayer nanolayer structure includes a thin Co, Fe or CoFe first nanolayer in contact with the MgO layer, a thin FeN or CoFeN second nanolayer on the first nanolayer and a thin Co, Fe or CoFe third nanolayer on the FeN or CoFeN nanolayer between the FeN or CoFeN nanolayer and the boron-containing layer. If the reference ferromagnetic layer also includes a boron-containing layer then a similar trilayer nanolayer structure may be located between the boron-containing layer and the MgO barrier layer.

Figure 1