

Abstract Submitted  
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**Effect of tantalum on magnetocrystalline anisotropy and tunneling magnetoresistance in MgO/CoFeB junction from ab-initio calculations** ROMAN CHEPULSKYY, DMYTRO APALKOV, New Memory Technology, Samsung Semiconductor RD Center, Samsung Electronics — Using ab-initio calculations, we demonstrate that boron is energetically attracted toward interface between MgO and CoFeB in MgO/CoFeB junction. We show that both magnetocrystalline anisotropy (MCA) and tunneling magnetoresistance (TMR) decrease when boron is present at the interface. However, when tantalum is used as seeding or capping layer (Ta/CoFeB/MgO), the segregation profile of boron changes. Namely, the most energetically preferable position of boron is inside and near tantalum rather than at MgO/CoFeB interface. Such change of boron segregation profile results in boron diffusion from MgO/CoFeB interface toward tantalum at annealing. The diffusion of boron toward tantalum may explain the experimentally observed effect of tantalum on increase of both MCA and TMR in MgO/CoFeB junction

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