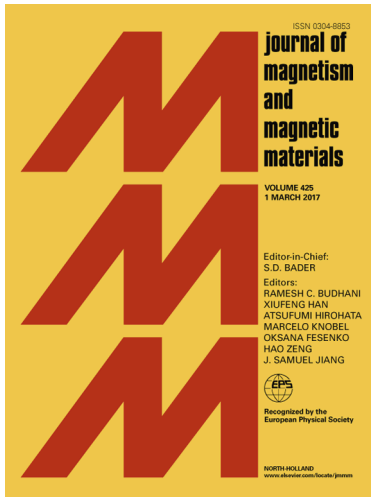

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Magnetic and exchange bias properties of YCo thin films and IrMn/YCo bilayers

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Abstract: We report on the structural and magnetic properties of YCo thin films and IrMn/YCo bilayers. X – ray diffraction infer that all the films are amorphous in nature. Magnetization versus magnetic field reveals room temperature soft ferromagnetism in all the YCo films. Thin films which were grown at 100 W sputter power with growth rates of 0.677, 0.694 and 0.711 Å/sec show better morphology and composition than 50 W (0.333, 0.444 and 0.277 Å/sec) grown films. Perpendicular exchange bias in as deposited bilayers is evident for IrMn/YCo bilayers. Exchange bias (EB) decreases in case of in plane measurements and enhances for out of plane measurements after perpendicular field annealing. EB is more in case of out of plane direction due to large perpendicular anisotropy in comparison with in plane direction. Above the critical thickness, EB variation is explained on the basis of random field model in the Heisenberg regime, which has been proposed by Malozemoff. Indeed there exists an inverse relationship between EB and IrMn layer thickness. Evidenced vertical shift apart from the horizontal shift for magnetization loops is attributed to frozen magnetic moments in one of the layers at the interface. Present results would indeed be helpful in spintronic device applications.

Keywords: Thin film, magnetic domain, ferromagnetism, coercivity, perpendicular exchange bias