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Decreasing the Spin Orbit Torque-critical current density to reverse perpendicular magnetization in Co_xTb_{1-x} ferrimagnetic based alloys. J-CARLOS ROJAS-SANCHEZ, T.-H. PHAM, P. VALLOBRA, D. LACOUR, G. MALINOWSKI, M. HEHN, IJL-CNRS/U. Lorraine, S. MANGIN, M.-C. CYRILLE, CEA-LETI, S.-G. JE, G. GAUDIN, O. BOULLE, SPINTEC, CEA-INAC/CNRS/Univ. Grenoble Alpes — We show the SOT-switching of perpendicularly magnetized //W(3nm)/Co_xTb_{1-x}(3.5nm)/AlOx(3nm) structure. Ferrimagnetic alloys allow us to tune the net magnetic moment by varying the Co concentration [1]. Samples were grown by sputtering on Si-SiO2 substrates and characterized by MOKE and SQUID measurements which allow us to estimate the critical compensation where the net moment reaches zero at room temperature. Then we studied the magnetization reversal in Hall crosses by analyzing the anomalous Hall Effect (AHE) when applying in-plane current pulses and an in-plane field H_x parallel to the current direction [2]. A minimum H_x of the order of 1 mT is needed for fully reverse the magnetization. The full reversal of magnetization has been observed in all our samples. More importantly, critical current densities for switching were found to decrease systematic when decreasing the Co concentration even in the Tb rich compositions samples. Our results bring out the role of different concentration of Co in Co_xTb_{1-x} alloys on SOT-switching providing a method to reduce the current density using ferrimagnetic alloys. [1] M. Gottwald et al., JAP 111, 083904 (2012) [2] J.C. Rojas-Sánchez et al., APL 108, 082406 (2016).

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