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**Statistical and Time Resolved Studies of Switching in Magnetic Tunnel Junction based Orthogonal Spin Transfer Devices** HUANLONG LIU, DANIEL BEDAU, DIRK BACKES, New York University, JURGEN LANGER, Singulus Technologies AG, PRADEEP MANANDHAR, Spin Transfer Technologies, ANDREW KENT, New York University, Spin Transfer Technologies, NEW YORK UNIVERSIT TEAM, SINGULUS TECHNOLOGIES AG TEAM, SPIN TRANSFER TECHNOLOGIES TEAM — We report statistical and single-shot time-resolved studies of spin transfer switching in OST-MRAM devices. These devices consist of a perpendicular polarizer integrated into a layer stack with an in-plane magnetized free and reference layer, which form the electrodes of a magnetic tunnel junction [1]. The perpendicular polarizer provides an initial torque – designed to reduce the incubation delay in switching. The demagnetization field created during the switching can further accelerate the reversal process [2]. The devices switch reliably at 0.7 V and 500 ps duration for both voltage polarities. We record the change of the device resistance in real time during the pulse to obtain the time needed to initiate the switching $\tau_{start}$ and the time between the initiation and the end of the switching $\tau_{switch}$ for every single switching event. $\tau_{switch}$ is determined to be less than a few hundreds of picoseconds, on the order of the precession time due to the demagnetization field and we find evidence for precession reversal under certain conditions. We further present results on the effects of pulse amplitude and applied field on $\tau_{start}$ and $\tau_{switch}$. This work was supported by Spin Transfer Technologies. [1] H. Liu et al., APL 97, 242510 (2010). [2] A. D. Kent et al., APL 84, 3897 (2004).

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