Abstract: In our information-everywhere society IT is a major player for energy consumption and novel spintronic devices can play a role in the quest for Green IT. Reducing power consumption of mobile devices by replacing volatile memory by fast non-volatile spintronic memory could improve speed and a one-memory-fits-all approach drastically simplifies the microelectronic architecture design [1]. For this we develop new highly spin-polarized materials and characterize the spin transport using THz spectroscopy [2]. Topological spin structures that emerge due to the Dzyaloshinskii-Moriya interaction (DMI), such as chiral domain walls and skyrmions possess a high stability and are of key importance for magnetic memories and logic devices [1,2]. We have investigated in detail the dynamics of topological spin structures, such as chiral domain walls that we can move synchronously with field pulses [3]. For current-induced dynamics we find that spin-orbit torques dominate the dynamics. We determine these independently of the DMI [4,5] showing that the sign of the DMI is opposite for stacks with CoFeB compared to stacks with a CoFe as the magnetic layer due to B diffusion at the interface. For strong DMI novel topologically stabilized skyrmion spin structure emerge. We demonstrate for the first time that a train of skyrmions in a “racetrack”-type device can be moved due to spin-orbit torques reliably [6] and whose dynamics is governed by the topology [7]. Finally, we study thermal heat currents as a source of spin currents and find a strong dependence of the measured signal on both the bulk and the interface [8].