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Controlling the Gilbert damping using spin pumping and magnetic impurities TIM VERHAGEN, HOLLY TINKEY, JAN VAN RUITENBEEK, JAN AARTS, Leiden University — The ability to control the magnetic damping parameter of thin magnetic films is an important issue when designing for example giant magnetoresistance (GMR) devices. A well-known way to influence the damping of the ferromagnetic (F) layer is by using the spin pumping effect in which a spin current is emitted into an adjacent normal (N) layer by bringing the F-layer into ferromagnetic resonance (FMR). As N layer, we used the well studied strongly spin sinking material Pt and the bad spin sink Cu, but also a Cu layer with Co impurities. We find that by adding a small amount of Co impurities, the Cu layer becomes as effective in damping as a Pt layer. In the latter case, the damping is caused by the strong spin orbit coupling. Using magnetic impurities, we rather make use of the inelastic spin scattering. This opens up new ways to control the damping of a ferromagnetic thin layer, for example in current-in-plane (CIP) GMR sensors, where the extra damping can suppress the spin transfer torque which becomes dominant with the further decrease of the size of the sensor.

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