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# A study of spin-pumping in Py/Pt and Py/Pt/Py structures

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Spin-pumping is the phenomenon by which a pure spin current can be injected into a non-magnetic metal from an adjacent ferromagnet. Spin-pumping into Pt is of great interest since Pt exhibits large inverse spin Hall effect, important for many spintroincs applications. However, it is not clear that the mechanism of spin-pumping into Pt is well described by standard spin pumping theory considering that Pt is strongly polarized at an interface with a ferromagnet. Evidence of this is observed in literature results, which disagree with their finding; the magnetic damping on Pt thickness is found to be exponential, linear or even discontinuous. To reconcile this we present a clean, experimental system, to test the measure of spin pumping contribution to magnetic damping, α. By studying α in ferromagnet/Pt and ferromagnet/Pt/ferromagnet structures we provide a very rigorous test for spin-pumping into Pt. The induced magnetic moment in Pt also mediates interlayer exchange coupling between the two ferromagnets which results in an in-phase and out-of-phase resonances modes. From the standard spin-pumping framework, this would imply that the two ferromagnets actively communicate with each other via pumped spin-current and would result in very different behaviour of α. Surprisingly, we find remarkable agreement between experimental results and standard spin pumping theory which involves interlayer exchange coupling. Our results suggest that the enhancement in damping is entirely due to spin-pumping without any contributions from spin memory loss or interface damping due to proximity polarized Pt.

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