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Issues related to YIG spintronics - thin film growth, spin pumping efficiency, and spin current generation[1]

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If a magnetic field is applied to a magnetic material, the field produces a torque on the magnetization of the material and drives it to precess. This precession is similar to the motion of a spinning top where the gravitational field produces a torque, instead of the magnetic field. It turns out that magnetization precession in yttrium iron garnets (YIG) decays slower than in any other known magnetic materials. This fact gives rise to the recent birth of a new paradigm in the discipline of spintronics – "spintronics using YIG." This talk will touch on several topics related to YIG spintronics. The first part will demonstrate the feasibility of the use of pulsed laser deposition and magnetron sputtering to grow low-damping, nanometer-thick YIG films. The second part will address the efficiency of spin angular momentum transfer across YIG/normal metal interfaces. The last part will report on the use of YIG thin films to produce pure spin currents; Detailed discussions will be provided on the comparison between spin current generations using traveling spin waves and uniform ferromagnetic resonance modes, the field dependence of spin current generation, and spin current enhancement in YIG/Pt structures via the use of a thin Cu spacer.

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