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#### Session D47: Spin Dynamics in Low Dimensional Materials

2:30 PM–5:06 PM, Monday, March 2, 2020

Room: 710/712

Sponsoring Unit: GMAG

Chair: Se Kwon Kim, Univ of Missouri - Columbia

#### **Abstract: D47.00008 : Effects of Low-Atomic-Number Dopants on Magnetic Relaxation in Epitaxial Fe Alloys\***

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We investigate the dependence of magnetic relaxation on dopant concentration in epitaxial thin films of  $\text{Fe}_{1-x}\text{V}_x$  and  $\text{Fe}_{1-x}\text{Al}_x$  grown by magnetron sputtering. By substituting Fe with lighter elements, one can expect to observe a reduction in the Gilbert damping parameter due to reduced spin-orbit coupling. The magnetic properties of these alloys were determined using broadband ferromagnetic resonance. For low concentrations of V, we observe a reduction in magnetic relaxation (e.g., effective Gilbert damping), consistent with previous experimental [1] and theoretical [2] results. In contrast, introducing Al causes a monotonic increase in magnetic relaxation. We attribute these behaviors to a modification in the density of states at the Fermi level, as shown by our density functional theory calculations. Our results serve as an avenue for predicting how to reduce Gilbert damping for applications in energy-efficient spintronic devices.

##### References:

[1] C. Sheck, *et al.*, *PRL* **98**, 117601 (2007)

[2] S. Mankovsky, *et al.*, *PRB* **87**, 014430 (2013)

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