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Effect of Interfacial Disorder on 1/f Noise in Magnetic Tunnel Junctions STEPHEN RUSSEK, JUSTIN SHAW, NIST, JUAN FRANCISCO SIERRA, Universidad Autonoma de Madrid — Magnetic tunnel junctions (MTJs) have the potential for low field (1pT/Hz$^{0.5}$@ 1 Hz) magnetic sensors. However, 1/f noise limits their performance. Here we correlate measured 1/f noise with dynamic Lorentz imaging and high-frequency ferromagnetic resonance (FMR) measurements. The measurements show that a large fraction of the 1/f noise is due to thermal fluctuations of nano-scale magnetic ripple structure which arises from a combination of disorder in the antiferromagnetic exchange bias layer and interfacial roughness in the tunnel barrier. We have changed the interfacial properties by varying growth conditions and by inserting nano-oxides. The samples show varying amounts of disorder that manifests itself as increased ripple structure, increased 1/f noise, and a broadened FMR linewidth. Time dependent Lorentz imaging has been used to directly observe nano-scale thermal fluctuations that give rise to 1/f noise.

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