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Characterization of micromachined Si cantilever giant magnetoimpedance (GMI) device for hybrid strain and magnetic field sensing in the high frequency regime — •Gregor Büttel and Uwe Hartmann — Institute of Experimental Physics, Saarland University, P. O. Box 151150, D66041, Saarbrücken, Germany

Magnetoresistive sensors on flexible substrates and cantilevers gain more attention for high sensitivity strain gauges and wearable electronics [1]. We have developed a fabrication process relying on common lithography and Si micromachining methods to obtain a coplanar waveguide-based GMI device located across the bending edge between a Si cantilever and its support to apply local stress. The device is 50 Ω on-chip terminated with NiCr film resistors to allow for network analyzer measurements in the GHz regime while bending the cantilever with a nanomanipulator. The signal line involving a Permalloy multilayer system can be integrated onto a Si Cantilever. Magneto-optical Kerr microscopy and micromagnetic simulations complement and support the impedance measurements revealing a magnetic domain rotation under strain. We discuss appropriate ac current frequencies for a high GMI ratio under applied stress/field and possible material and layer systems to further enhance the sensors performance. [1] Tavassolizadeh, A. et al. APL 102.15 (2013): 153104.

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Email:	**buettel@physik.uni-saarland.de**