Measurements and modelling of a magnetoresistive biosensor

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Abstract: A tunnel junction magnetoresistive biosensor is completely characterised through experimental measurements and theoretical models are derived in order to identify and describe its electrical, temperature and magnetic behaviour. The biosensor is the basis sensing element of a fully integrated biochip that is included on a portable handheld microsystem for biomolecular recognition. The biochip has a matrix-array structure and each biosensor site is the series between a pin thin-film diode (TFD) and a magnetic tunnel junction (MTJ). Sensor measurements, characterisation and modelling are fundamental to determine microsystem measurement resolution, biochip scan rate, sense local temperature, perform temperature control and achieve system calibration. Results show that the TFD may be used both as a temperature sensor and an indexing switching device and that the MTJ has a linear characteristic. Biosensor experimental frequency response and noise measurements are also presented.1 © 2006 IEEE.

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