

SPINTRONIC DEVICES FOR BIOMOLECULAR AND BIOMEDICAL APPLICATIONS

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Spintronic based devices targeting various biomolecular as well as biomedical applications will be reviewed. All these share a magnetoresistive based sensor (either a spin valve, a tunnel junction), may have an arraying current line structure that carries labeled biomolecules and use magnetic particles with dimensions ranging from few nm to um size to label biomolecules. In particular spintronic based biomolecular recognition portable platforms for point of care gene expression or immunoassay detection will be reviewed, reaching into femtomolar detection range. Lateral flow bio assays can, as well as cell cytometers can also benefit from this technology and will be discussed. At the single molecule manipulation and detection, magnetic tweezers will be demonstrated that can apply pN forces to single labeled immobilized molecules, while magnetoresistive sensors detect biomolecule stretching. Finally, efforts into pushing sensor limits below pT at few Hz will be discussed aiming at neuroelectronic or magnetocardiography applications.