Diode/magnetic tunnel junction cell for fully scalable matrix-based biochip

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Abstract: Magnetoresistive biochips have been recently introduced for the detection of biomolecular recognition. In this work, the detection site incorporates a thin-film diode in series with a magnetic tunnel junction (MTJ), leading to a matrix-based biochip that can be easily scaled up to screen large numbers of different target analytes. The fabricated 16×16 cell matrix integrates hydrogenated amorphous silicon (a-Si:H) diodes with aluminum oxide barrier MTJ. Each detection site also includes a U-shaped current line for magnetically assisted target concentration at probe sites. The biochip is being integrated in a portable, credit card size electronics control platform. Detection of 250 nm diameter magnetic nanoparticles by one of the matrix cells is demonstrated. © 2006 American Institute of Physics.

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