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Theme: NanoBio and Bioengineering

Abstract:

Magnetic nanowires detection with yoke-shaped magnetoresistive sensors; towards a magnetic cytometer

We are developing technologies for detection of single and multi-segmented magnetic nanowires using yoke-shaped GMR or TMR magnetoresistive sensors integrated into a microfluidic channel. Towards a magnetic cytometer, we can detect single nanowire signatures by detecting the stray field of the magnetic nanowires as they pass over the sensor as well as their velocity and magnetization. To achieve this goal single-metal Cobalt Nickel nanowires were produced. Leading to the production of multi-segmented nanowires using CoNi with a copper (Cu) spacer layer (CoNi-Cu-CoNi). Yoke-shape GMR sensors were fabricated, providing linear GMR response of 7.3, configured in a gradiometer pair. Subsequently we patterned a TMR sensor based on an MgO barrier magnetic tunnel junction providing a good linear TMR response of 130%. A detection system was implemented to capture and analyse signals. The resulting prototype system will lead to detection of molecular biomarkers of human diseases using magnetic nanowire barcodes.

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