

## Detection of magnetic particles for biological applications using a local-Hall device

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The sensor for nano-scale magnetics has potential applications in fundamental study of biological interactions as well as utilities in bio-analysis and biomedical applications. Micro-magnetic sensors proposed thus far are based on magnetoresistive technologies such as GMR and TMR which suffer from nonlinear responses and saturation at low field. Another kind of sensor is Hall device which has difficulty in the integration of sensor array and requires a bulky system caused by using AC magnetic field.

To overcome the drawbacks of these conventional devices, we have fabricated a magnetic sensor made of InAs 2DEG and its signal is detected by measuring longitudinal resistance. A magnetic particle is located between voltage probes and the stray field generated by the magnetic particle leads to the variation of resistance (see  $R_{BC}$  in Fig1.(b)).

Further miniaturization of our device to submicron dimensions will lead to a high performance biological sensor for detection of nanometer-size particles.

