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**BIO APPLICATION OF HIGH-T<sub>c</sub> SQUID MAGNETIC SENSOR**

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We have proposed two medical applications using ultra-small magnetic particles. One is a Lymph-node detection system and the other is a DNA probing system. In both cases, magnetic particles are detected by a sensitive high T<sub>c</sub> SQUID magnetic sensor. We demonstrate that lymph nodes containing particles extracted from the rat can be measured by a SQUID gradiometer. The iron content of the lymph node sample can be calculated as 10 μg, which value correspond to 0.2% of the injected iron. Although it is difficult to estimate the accumulated weight of iron particles for the human case, we think it must be more than 10μg because the volume of the injection must be 20 times larger than that of the rat. This performance is good enough to apply this system to the real sentinel lymph node biopsy.

In the application of DNA detection system, a preliminary experiment has been done. We have developed a detection system for DNA using a high T<sub>c</sub> SQUID. A hybridization of DNA with relatively short length (30 bp) was investigated. One strand (Sample DNA) was labeled with Fe<sub>3</sub>O<sub>4</sub> ultra-small magnetic particles and the other (probe DNA) was anchored on a glass slide. They were hybridized each other on the slide. Then the hybridized DNA was evaluated in the presence of ac excitation field by high T<sub>c</sub> SQUID. The signal increases along with the number of the sample DNA and then shows the tendency of saturation at the number of the probe DNA on the substrate. Therefore it is found that the signal does not increase even if the number of the applied sample DNA was increased, because the reaction is determined by the number of probe DNA on the substrate. This result indicates that the hybridization was successfully done.