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Magnetic manipulation of light reflection and mirror angle for the organic crystal mirror in minute solution

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Introduction

Recently, the DNA diagnosis for early cancer detection and genetic defect diagnosis collect much attention in the medical and clinical field. So, DNA sensor using tunnel current [1] and Lab-on-a-chip is advanced gradually. Also, in magnetism, nucleic acid base crystal is had high grade of expectation as a new magnetic material. The development of semiconductor combining guanine and silicon is carried out [2]. In the nano technology field, magnetic manipulation technique for single molecule called magnetic tweezers [3] is advanced. Our study was carried out magnetic manipulation of light reflection from the micro-mirror using guanine crystal derived from organism for microfluidic systems in medical nano technology.

Methods

The guanine crystal derived from organism is able to be extracted from goldfish scales. The obtained crystals dispersed in the distilled water were used as suspension in the experiments. In addition, we prepared the DNA solution (1 %) by mixing DNA powder derived from salmon sperm and distilled water boiled at 90~100 degree. The DNA solution was added to guanine crystal suspension and enclosed in the chamber. Similarly, we prepared the guanine crystal suspension including sucrose and including nothing (the control sample). The configuration which was the optical microscope, the electromagnet and these samples was able to observe the guanine crystals under magnetic fields.

Results and Discussion

This study reported that we observed the guanine suspension including DNA, that including sucrose and control sample and compared the behavior of guanine crystals in these suspensions. In results, in the case of the guanine suspension including DNA, guanine crystals didn't oriented under magnetic fields at 0.5 T. However, in the case of the guanine suspension including sucrose and control sample, guanine crystals indicated magnetic orientation under magnetic fields at 0.5 T.

Next, we tried to control the light reflection from the guanine micro-mirror with DNA joints. We were successful in controlling the guanine micro-mirror angle and light reflection, as shown in Fig. 1.

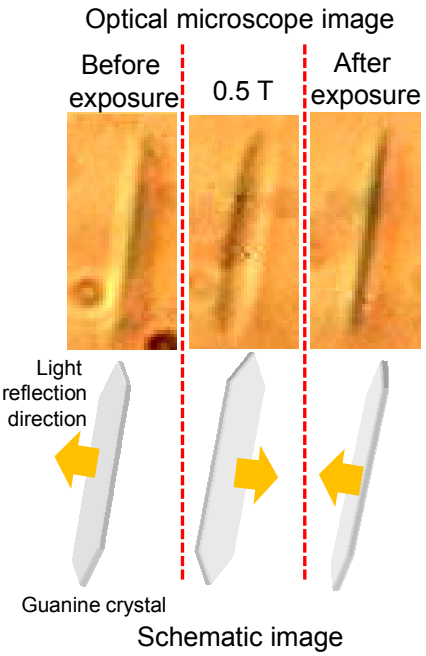

Fig. 1. Optical image and schematic image of light reflection change from guanine micro-mirror with and without magnetic fields.

Reference

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