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Colloidal Stability of Nanometric $CoFe_2O_4$ Core-Alginic Acid Shell Particles

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To improve the colloidal stability of nanoparticles, the surface of nanoparticles could be modified with a polymer [1].

In this study, $CoFe_2O_4$ nanoparticles have been synthesized by thermal decomposition and adsorbed with alginic acid as the surfactant by applying ultrasonic. As the added alginic acid amount increased in a weight loss test by heating of magnetic particles, the thickness of alginic acid-adsorption layer increased non-linearly, and the proper adsorption amount was observed in the alginic acid of 0.4g.

The adsorption of alginic acid onto the surface in water dispersed $CoFe_2O_4$ nanoparticles and zeta potential of alginic acid-adsorbed $CoFe_2O_4$ nanoparticles have been investigated to optimized the colloidal stability of $CoFe_2O_4$ core-alginic acid shell nanoparticles. The adsorption amount of alginic acid increased with the decrease of adsorption pH. The zeta-potential of $CoFe_2O_4$ nanoparticles shifted to a lower value after adsorption of alginic acid.

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DNA Electrophoresis under the Gradient Magnetic Field

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1. Introduction

It has been reported that DNAs are oriented perpendicularly to the magnetic flux as a result of the anisotropy of diamagnetic susceptibility. Our research indicated that the electrophoretic velocity of DNAs was decreased under the homogeneous magnetic field. The both phenomena were thought to be related from the viewpoint of magnetic orientation of DNA. The diamagnetic DNA must be also influenced by the magnetic force in the gradient field. In this study, the electrophoresis of DNA is performed in the gradient magnetic fields. New separation method of DNAs using magnetic field is suggested.

2. Experiment

Two electrophoresis systems ($w70 \times d96 \times h34$ mm^3) were placed in the bore of the water jacket attached on the superconducting magnet. Agarose gels ($w40 \times d40 \times h7$ mm^3) were used as the support media for the DNA electrophoresis. The gel injected with 10kbp DNA (EZ Load™ HT Molecular Markers, Bio-Rad Laboratories, Inc.) was put in the electrophoresis system and was filled with TAE buffer. These electrophoresis systems were placed atthe positive and negative gradient fields ($\pm 420 T^2m^{-1}$) and at the center of field with no gradient field. Magnetic field density of B=7.1T was the same at each position. To start the electrophoresis, then, the voltage of up to 50V was applied to the system parallel to the direction of the magnetic field. After 4 hour the system was took out from the magnetic field, and DNA was dyed. The electrophoretic patterns were measured under UV.

3. Results and Discussion

Figure 1 illustrates the electrophoretic distances of DNAs as a function of the electophoretic voltage. The distances at each position were increased with increasing voltages. In the low voltage region the electrophoretic distances of DNAs were the same in spit of the gradients. On the other hand, the distances were different at three gradient positions in the high voltage region. The distance in the negative gradient field was longer than that in the positive one. It was recognised that the DNAs were accelerated and are deaccelerated in the negative and the positive gradient fields, respectively. These results are discussed with the influence of the magnetic force. The electrophoresis under the gradient field can be used for a new separation method of DNAs.

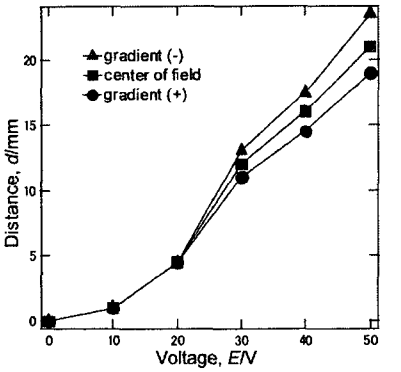

Fig. 1. Voltage dependence of the migration distance of DNA. (B=7.1T, t=4h)