

## QD12

### Colloidal Stability of Nanometric CoFe<sub>2</sub>O<sub>4</sub> Core-Alginate 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<sub>2</sub>O<sub>4</sub> nanoparticles have been synthesized by thermal decomposition and adsorbed with alginate acid as the surfactant by applying ultrasonic. As the added alginate acid amount increased in a weight loss test by heating of magnetic particles, the thickness of alginate acid-adsorption layer increased non-linearly, and the proper adsorption amount was observed in the alginate acid of 0.4g.

The adsorption of alginate acid onto the surface in water dispersed CoFe<sub>2</sub>O<sub>4</sub> nanoparticles and zeta potential of alginate acid-adsorbed CoFe<sub>2</sub>O<sub>4</sub> nanoparticles have been investigated to optimized the colloidal stability of CoFe<sub>2</sub>O<sub>4</sub> core-alginate acid shell nanoparticles. The adsorption amount of alginate acid increased with the decrease of adsorption pH. The zeta-potential of CoFe<sub>2</sub>O<sub>4</sub> nanoparticles shifted to a lower value after adsorption of alginate acid.

#### REFERENCES

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## QD13

### 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 ( $w70 \times \phi96 \times l/34 \text{ mm}^3$ ) were placed in the bore of the water jacket attached on the superconducting magnet. Agarose gels ( $w40 \times d40 \times l/7 \text{ mm}^3$ ) 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 at the positive and negative gradient fields ( $\pm 420 \text{ T m}^{-1}$ ) and at the center of field with no gradient field. Magnetic field density of  $B=7.1 \text{ T}$  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 electrophoretic 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 spite 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 decelerated 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.

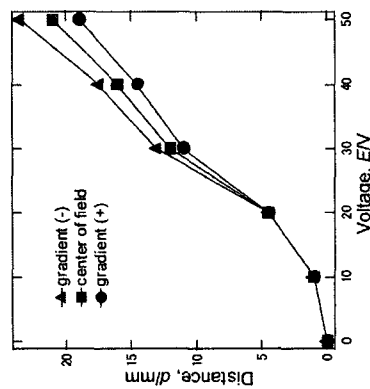


Fig. 1. Voltage dependence of the migration distance of DNA. ( $\beta=7.1 \text{ T}$ ,  $\epsilon=4$ )