Report of MERIT Corporate Internship
(2016. 1. 25 – 2016. 3. 25 DIC Corporation)

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Summary

I worked at Advanced Characterization Research Center in Central Research Laboratories of DIC Corporation as an intern from the 25th of January to the 25th of March 2016. Their business is manufacture and sales of printing ink, organic pigments and synthetic resin which is main component of ink as well as various chemical products such as resin for industrial use and liquid crystal materials. The Advanced Characterization Research Center is a department for characterization of their products.

Internship Work

I carried out fundamental research about water-based printing ink which is one of the main products of DIC. The main coloring component of printing ink is pigment particles and some additives such as dispersants are indispensable for dispersing pigments into solvent. Because property of ink products strongly depends on dispersed state of pigment particles, pigment dispersants must be chose appropriately for each pigment.

Pigment particles are dispersed into solvent by inter-particle repulsion forces such as Coulomb repulsion, steric hindrance and osmotic pressure effect caused by adsorbed dispersant molecules on the pigment-solvent interfaces. This time, I focused on the property of pigment dispersing polymers and investigated the correlation between pigment dispersing ability of the polymers and characteristics of the polymer, such as molecular conformation and compatibility with water. As a result, I succeeded in pointing out some correlations between structural parameters of the pigment dispersing polymers and pigment dispersing ability. I expect that the results contribute to the development of superior ink.

During the internship, I visited one of the plants of DIC corporation. There I looked on

processes of printing and product packages printed by DIC products, and realized the importance and difficulties of optimization of various ink properties, such as a degree of pigment dispersion, viscosity, surface tension, drying speed and so on.

Overview

From the internship in DIC for 2 months, I experienced what it is like to work as a researcher in company and it was very precious experience for me to design my career after taking Ph. D. What was especially impressive is that, in DIC, development of new products was brought forward in tight mutual collaboration between several departments specialized for each field from material synthesis and characterization to practical production. I felt the collaboration between the departments was much tighter than that in academia where researchers often bring forward their work rather individually. I realized that such a highly organized system is one of the characteristics of research and development in company, and thus researchers working there are needed to own comprehensive knowledge in broad fields. In the experiments, in addition to relatively classic techniques in polymer science, I carried out some experiments for investigation on pigment particle surfaces and that was the first time for me to do such experiments. So it was a useful experience not only for knowing about company but also for my research in doctoral course.

Acknowledgement

DIC corporation kindly accepted such a very long internship and the staff in DIC corporation took very care of me during work and experiments. Especially, Mr. Tamura in The Advanced Characterization Research Center take long time for me to discuss about experimental results and experimental methods. My supervisor, Prof. Shibayama arranged contacts with DIC corporation and kindly managed my research activity during the internship. I sincerely would like to give my gratitude for their kind supports. In addition, I also acknowledge the support by MERIT for organizing this precious occasion.