

MERIT Internship Report (Domestic)

Graduate School of Science, Department of Chemistry

Doctoral 3rd year, MERIT 8th year

Shoma Shimizu

Host Company

NICHIREKI CO., LTD. (Technical Research Institute)

Period

Nov. 1, 2022 - Nov. 30, 2022

Theme

Millimeter-wave absorption properties of asphalt mixtures and the effect of epsilon iron oxide addition

Background

The reasons and perspectives for applying for the internship are as follows.

- (1) Because I considered that I could get an experience in the research field, which is different from research at the laboratory.
- (2) Because I considered that the research in the research center would be familiar to me in my daily life and that it would contribute to society.
- (3) Because I considered that I would be able to make effective use of my research experience, knowledge, and technology.
- (4) Because I considered that I would be able to learn new knowledge and skills.

Based on the above, I selected NICHIREKI CO., LTD., which is a leading role in Japan's road pavement industry, as my internship site.

Internship Activities

First, I learned about asphalt mixtures and their uses. Asphalt is the residue of petroleum after the removal of its lighter components and is made up of organic molecules containing heavy compounds such as asphaltene. Generally, asphalt mixtures are made by mixing asphalt with aggregate. In reality, the asphalt used in the asphalt mixture is modified asphalt, in which asphalt

is mixed with resin and other materials to adjust its physical properties. One of the asphalt mixtures developed is a porous asphalt mixture designed to allow water to pass through as a drainage feature of the road and is used in the Tokyo Metropolitan Expressway and other areas. In road pavement, the right material is in the right place, and asphalt mixtures required in cold and warm regions are very different. From the viewpoint of construction, asphalt emulsions are often used to emulsify asphalt, and the drying time can be controlled by adjusting the emulsion. Various tests are performed on this asphalt and asphalt mixtures, ranging from physical tests such as softening point tests to chemical analyses such as IATROSCAN. I actually prepared several types of asphalt mixtures by mixing asphalt, aggregates, and iron oxide as a part of filler. As my internship research theme, I also evaluated the millimeter-wave absorption properties of asphalt mixtures at my laboratory. In order to maintain the confidentiality of the results obtained, specific research data and values are withheld here. However, the research results were successful and considered to have contributed to the company that accepted my internship and to society in the future.

Impression

During this internship, I had the opportunity to create real materials used in society and experienced many industrial perspectives that are different from those of a laboratory. I felt that values and judgment are always required to grow as an industry, and I understood that many people are responsible for promoting various projects to make the company a reality.

Acknowledgments

I would like to thank Nichireki Corporation and the people at the Technical Research Institute for graciously accepting my internship and Mr. Oh for taking charge of me. They gladly accepted me immediately after my request and took me to the Public Works Research Institute and other places. The company and workers at my internship place gave me a lot of help in living in an unfamiliar place, and I was able to enjoy my internship period both publicly and privately. I would like to thank them again for taking time out of their busy schedule to provide me with an opportunity to gain valuable experience. I would also like to thank my supervisor, Prof. Okoshi, for creating this internship opportunity for me, and my MERIT associate supervisor, Prof. Tsukuda, for his kind consent regarding the internship. I would also like to thank the MERIT office and all the people involved in this program for their cooperation with this work.