MERIT Internship Report

MERIT 5th
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Date

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Host Company

Toray Industries, Inc. Advanced Materials Research Laboratory

Theme

Research on Graphene

Background

Graphene is an allotrope composed of a single layer of carbon atoms arranged in hexagonal lattice, which is well known as a basic structure of graphite and carbon nanotube. Various kinds of its unique features are known such as adsorption, electrical conductivity, thermal conductivity, and molecular separation ability. Graphene is a promising functional material to apply various use. In Toray Industries, Inc, the research group of Advanced Materials Research Laboratory is also investigating about the application of graphene. They have investigated its material character and application sufficiently. The study about fundamental aspects of graphene could expand its application uses.

Themes

1) Functionalization of graphene oxide by chemical modification

In general, graphene oxide which is synthesized by chemical exfoliation method has carboxy groups, hydroxy groups and epoxy groups. These functional groups are useful to connect other functional groups and achieve chemical modification. In this research internship, I tried to achieve chemical modification of graphene oxide by sulfonic acid group, which was confirmed qualitatively.

2) Analysis of graphene oxide

In this research internship, I tried to purify graphene oxide by using various purification methods and analyzed their properties. The structure of each flakes was observed by SEM and AFM. As a result, the relationship between the purification method and structure of graphene flakes were revealed.

Impression

I had investigated about coordination chemistry in the solution state in my research career. So, the research about the mixture of graphene oxide is my first experience to use bulk compound at the solid state. The synthesis, purification method, and analysis were almost different from the solution state chemistry, and they were very interesting for me. I was very satisfied with this research internship.

The host group has investigated about graphene in wide range. From the research meeting, I studied about the R & D process flow and found the difference between the study at the university and R & D at the company. Especially, I was impressed with the topic of large-scale synthesis because I belong to graduate school of science and I have poor knowledge and experience about chemical engineering. I recognized the great difference between the synthetic procedures at the university and the company.

Acknowledgements

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