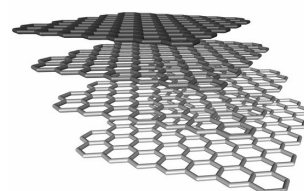


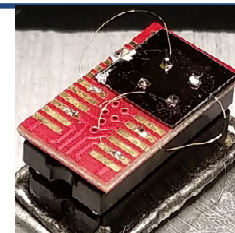
Research Topic	Application for superconducting with bilayer graphene and Improvement of transferring CVD graphene on silicon substrate	Graduate School of Engineering
Host University	Georgia Institute of Technology / Atlanta / United States of America	Electrical, Electronic and Mechanical Engineering
Duration	From August 22, 2019 to January 14, 2020	ISU Ryota

Summary of the Research Activities

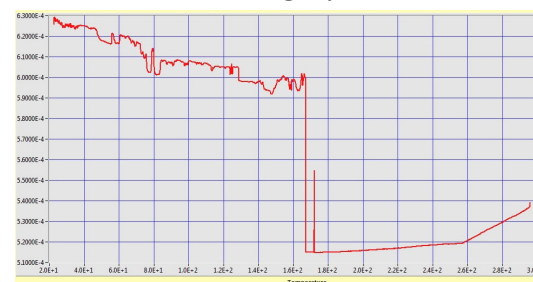
Graphene, newly discovered in 2004, is gaining worldwide attention. Graphene is a layer extracted from graphite as shown on the right. Since the physical properties have not been clarified yet, I wanted to confirm the superconductivity phenomenon using graphene. The figure on the right shows the device of bilayer graphene and the temperature dependence of the resistance. The resistance decreased with temperature. However, the resistance became unstable below -100 degrees. This may be due to the poor contact resistance or quality of the graphene film. We tried on other devices, but could not resolve this issue. Therefore, new devices have been manufactured. The dry transfer was used because chemical residues were also considered to be a factor in quality degradation. PMMA was coated on CVD graphene and PDMS was attached to PMMA / graphene as a support material. Copper was melted with an etchant, and the PDMS / PMMA / graphene block was transferred to a silicon substrate. A part of the transferred film is displayed on the right. A good graphene film can be confirmed over a wide range. However, electrical measurements and accurate film condition checks have not been performed, so properties will be measured and improved in the future.



Structure of graphite



Device of bilayer graphene



Temperature dependence of bilayer graphene

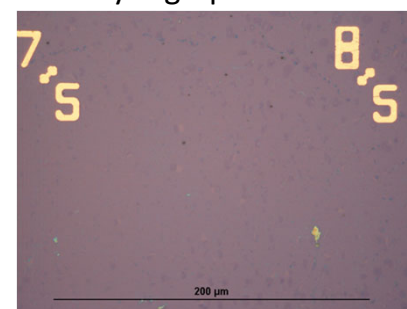
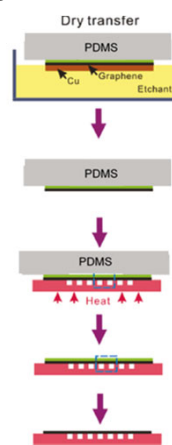
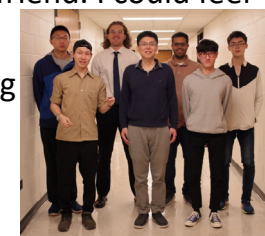


Image of transferred graphene

Process of dry transfer

College Life, Friends and Others

They feel free to talk to clerks, receptionists, and people who have joined together by elevator. I felt different cultures by saying "thank you" and "you're welcome" in various situations. I knew the difficulty of housework when I lived alone for the first time, but at the same time I could enjoy the fun of cooking. I also went to Washington DC and New York for Christmas and New Year with a friend. I could feel the difference in English depending on the location.



指導教員講評

大学院での研究の方向性を定めることができ、人生の目標も新たに定めることができたようなので、刺激的な海外研究留学ができたと思います。

指導教員氏名: 藤元 章