Tokuji Miyashita ／ Professor ／ Institute of Multidisciplinary Research for Advanced Materials

Profile

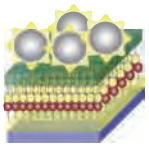
Tokuji Miyashita is currently a Professor and the Deputy Director of the Institute of Multidisciplinary Research for Advanced Materials at Tohoku University. He graduated from Tohoku University in 1971 and received his PhD from Tohoku University in 1976. He began his career as a Researcher at Sagami Chemical Research Center and then joined Tohoku University as a Research Associate. He was promoted as a Professor in 1993 at Tohoku University. He majors in polymer materials chemistry, especially preparing a variety of functional polymer nanomaterials. Recently he has focused on the field of bottom-up nano-technology using polymer ultra-thin film (polymer nano-sheets) and the fabrication of soft nano-devices composed of various functional polymer nano-sheet assemblies. Moreover, he has developed novel hybrid polymers as a project leader in NEDO (Government support). He has received several awards, including the award of The Society of Polymer Science Japan in 1997 and the award of The Society of Pure & Applied Coordination Chemistry in 2004.

Research Activities

The major research field is polymer nano-material chemistry. It is well-known that many kinds of materials in surroundings such as proteins, cellulose, silk, DNA, fibers, plastics, rubber are composed of polymer compounds. In his research group, studies on the preparation of ultrathin polymer film with one molecule thickness (about 1 nm) and polymer assemblies aiming at the creation of new polymer nano-materials applicable to “Nanotechnology” are carried out. He employs the Langmuir-Blodgett technique, utilizing water surface as molecular architecture technology to fabricate tailor-made polymer nano-sheet assemblies. Very stable, uniform, and widely applicable polymer nano-sheets have developed in his group and various functionalities for molecular electronics, photonics, sensor, and plasmonics can be incorporated into the polymer nano-sheet assemblies.

The following are current topics:

- ▸Tailor-made fabrication of 2D and 3D nano-structures using polymer nano-sheet assemblies.
- ▸Optical waveguide sensor and molecular sensor
- ▸Organic transistor and photodiode composed of polymer nano-films
- ▸Hybrid assemblies of metal nanoparticles and polymer nano-sheets
- ▸Fabrication of new nano-devices utilizing surface plasmon resonance produced on hybrid nano-assemblies.
- ▸Preparation of novel thermal resistance, transparent hybrid polymer film applicable to film electronics



Polymer hybrid nano-assemblies with nanoparticles

Film electronics

Polymer nano-sheet

Ordered 3D organized assembly

Message

It is a great honor for me to receive the Distinguished Professor Prize from Tohoku University. I believe that the prize is a result of collaborative work by all the members of Miyashita research group. Although it is important for research work to pick up excellent researching targets with novelty, uniqueness, and expansibility, it should also be essential to assemble a good research team with many colleagues and to enjoy the research work together. I intend to request my students to do research and study with an open mind, deep emotion, and a great dream. I hope students fall in love with study and research. A great result will come out after conducting research work with the simplicity and enthusiasm of childhood.