理工学部講演会

Two-Dimensional Correlation Spectroscopy and Development of Novel Biopplastics Nodax™

講師：Prof. Isao Noda (Univ. of Delaware)

日時：2月20日（火）16：00～17：30

場所：VII号館111号室

野田博士によって提案、開発された二次元相関赤外分光法について解りやすく説明していただく。この方法は、物質科学から生命科学の非常に広い分野で利用されており、特に本方法を利用することによって開発された生分解性ポリマー”Nodax”についても講演いただく。

（言語：主に日本語）

担当：水木純一郎（先進エネルギーナノ工学科）

Two-Dimensional Correlation Spectroscopy and Development of Novel Biopplastics *Nodax*™

Isao Noda

Two-dimensional (2D) correlation spectroscopy is a versatile spectral data analysis technique which has gained wide popularity over the last 30 years in both academic and industrial laboratories. It is used in many different fields, including inorganic and organic chemistry, life science and medicine, as well as polymer and materials science applications. In 2D correlation spectroscopy, spectral maps defined by two independent variables, such as IR wavenumbers, are generated by applying a form of cross correlation analysis to the variations in spectral intensities induced by an external perturbation, such as temperature, pressure, concentration, or electromagnetic field. Notable features of 2D correlation spectra are: the simplification of complicated spectra consisting of many overlapped peaks, enhancement of spectral resolution by spreading peaks over the second dimension, and establishment of unambiguous assignment through correlation of bands selectively coupled by various interaction mechanisms. Some of the interesting applications of 2D correlation spectroscopy will be briefly presented to show its utility.

2D correlation spectroscopy has played a key role in the materials development effort in my laboratory, especially in the molecular design and characterization of a novel class of bio-based and fully biodegradable plastics, which is now commercialized by Danimer Scientific in Bainbridge, GA under the trade name of *Nodax*™. Danimer's *Nodax*™ belongs to a very intereting class of aliphatic polyesters called poly(hydroxyalkanoates) or PHAs, which are found as intracellular inclusion bodies in various microorganisms. Certain microbes accumulates PHAs as an energy storing medium, and many types of PHAs have been known. Because they are made by bacteria, PHAs are fully biodegradable under right conditions. However, most of PHAs known in the past unfortunately had serious shortcomings in their physical properties to be a useful material. 2D correlation spectroscopy provided a critical insight into a way to modify the molecular structure of PHA to make this class of biomaterials much more useful and inexpensive to become a viable replacement for conventional petroleum-based plastics. My talk will cover the earlier development of this exciting new bioplastics and subsequent fundamental scienentific research effort carried out on PHAs using 2D correlation spectrtoscopy.