The 14th Clayteam Seminar

"Development of Low Environmental Load Materials and Advanced Environment Measurement"

Date and Time : Aug 27, 2013(Fri.)12:30-17:00 *Reception Starts 12:00-
Venue : Hall A-1, AER 21st Floor, TKP Garden City Sendai
3-1, Chuo 1-chome, Aoba-ku, Sendai, 980-6121, Miyagi, Japan
***Language : Japanese**

[Program]

12:00-12:30 BOOTH EXHIBITION

12:30-12:40 The 14th Clayteam Seminar
【The Opening Remark】

12:40-13:40 【Chairperson】 Dr. Takeo Ebina, AIST
Speaker1 Special Lecture
"Combinatorial Computational Chemistry – Novel Industrial Innovations based on Theoretical/Computational Methods"
Prof. Akira Miyamoto (New Industry Creation Hatchery Center)

13:40-14:40 【Chairperson】 Dr. Toshishige Suzuki, AIST
Speaker2 Keynote
"Development of Advancing Simplified Analysis Method, and Expansion of Application to its Practical Analysis"
Mr. Kanji Okauchi (Chairman, Kyoritsu Chemical-Check Lab., Corp.)

14:40-15:00 Break

15:00-15:40 Speaker3
"Development of test strips for judging base number of used engine oil with chemical reaction in ultrafiltration membrane"
Associate Prof. Masatoshi Endo (Yamataga University)

15:40-16:20 【Chairperson】 Dr. Hiromichi Hayashi, AIST
Speaker4
"Development of continuous monitoring system for environmental hazardous compounds using a QCM type sensor"
Dr. Ryuichi Naganawa (AIST)

16:20-17:00 Speaker5
"Development of Standard Conductance Element and Performance Evaluation of Gas Barrier Films"
Dr. Hajime Yoshida (AIST)

17:00 【The Closing Remark】

[Get-Together-Reception]
Venue : Hall C, TKP Garden City Sendai (AER 30F)
Fee : 5,000yen

The 14th Clayteam Seminar

<Short Abstract>

[Speaker1] **"Combinatorial Computational Chemistry – Novel Industrial Innovations based on Theoretical/Computational Methods"**
Prof. Akira Miyamoto (New Industry Creation Hatchery Center)

Computational chemistry is a new area of chemistry which has been created by a significant advance in theoretical chemistry and computer technology. By developing mesoscopic and macroscopic simulators in addition to atomistic and electronic simulators, multi-scale simulations of industrial products and processes can be performed. Development of multi-physics simulators such as chemical reaction dynamics, electrical conductivity, diffusions of ions and molecules, thermal conductivity, tribology, promotes the application of the simulators to a variety of industrial targets such as automotive engine, battery, catalysts, fuel cells, solar cells, phosphors, plasma display panels, etc. Successful examples of industrial applications are described.

[Speaker2] **"Development of Advancing Simplified Analysis Method, and Expansion of Application to its Practical Analysis"**
Mr. Kanji Okauchi (Chairman, Kyoritsu Chemical-Check Lab., Corp.)

Analysis often requires the accuracy, but not in all types of situation. There are times when getting the result quickly with just an approximate value is more important. One example is analysis for wastewater, where rapid analysis is much useful for detecting the area of environmental pollution. However, demand for accuracy and ability to measure much lower value even for simplified analysis is becoming higher, at the same time as keeping the benefit of getting the result rapidly. So, we are now developing the simplified analysis utilizing the new separation-concentration technology.
It started off with proposal from AIST Tohoku. Although it did not turn out as their proposal, we have adopted the devised method and developed the whole new phase of simplified analysis that much lower concentration value is measurable. I would like to introduce this new method along with others.

[Speaker3] **"Development of test strips for judging base number of used engine oil with chemical reaction in ultrafiltration membrane "**
Associate Prof. Masatoshi Endo (Yamataga University)

A simple colorimetric method for determination of base number (BN) in used engine oil with test strips was developed. The oil continuously exposed to acidic combustion products and these must be neutralized before they can corrode engine parts. The levels of basic constituent come from vital additives in engine oil which protect the engine components from wear and deposit. As oil ages with use, the alkalinity

decreases, signaling a need to change the oil. BN can be replenished by an oil change. Titration method is commonly employed for the determination of BN. Recently we have reported new technique for simple and rapid discrimination of used oil degradation stages with membrane filters. In this research, test strips were made up of pH indicator such as Bromocresol Green and Thymol Blue impregnated ultrafiltration membrane made of polyether sulfone and support. The color of the dense layer side of the test strip changed from red to yellow, green, blue with sufficient alkaline in the engine oil. BN was able to be confirmed visually about one minute after dropping the oil on site. This method was available whether the used oil has desired BN or not.

[Speaker4] **"Development of continuous monitoring system for environmental hazardous compounds using a QCM type sensor"**
Dr. Ryuichi Naganawa (AIST)

VOC selective sensors which based on a quartz crystal microbalance (QCM) have been developed. To obtain a selective response, various adsorbent has been uses for sensing elements. Today, I will report some examples of using the microporous material and the artificial lipid. And, an application example to a simple sensor network inexpensive using ultra-small microcomputer board will be introduced.

[Speaker5] **"Development of Standard Conductance Element and Performance Evaluation of Gas Barrier Films"**
Dr. Hajime Yoshida (AIST)

The task of us, pressure and vacuum standard laboratory of NMIJ, is to develop, maintain, and supply national standard of pressure, vacuum, and leak in Japan. Both confirming international compatibilities between other national standards and that of Japan, and developing new techniques to measure pressure/vacuum more reliable and accurate is also being performed. Standard Conductance Element (SCE), which was developed for "in-situ" calibration of vacuum gauges, is a sintered stainless steel filter to introduce various gas species with known flow rate into a vacuum chamber. Since the gas flow through SCE has high reproducibility and reliability, it will be useful as a reference standard to measure the permeability of gas barrier films.