69th (Tokyo), 70th (Osaka)

SUGA ACADEMIC SEMINAR: WEATHERING
PROGRAM 2019

TIME	**Tokyo (69th)** **Date: October 24, 2019 (Thu)** **Location: Arcadia Ichigaya**	**Osaka (70th)** **Date: October 29, 2019 (Tue)** **Location:Osaka International Convention Center**
10:00 – 10:10	Introduction by **Shigeo Suga**, Director-General of Suga Weathering Technology Foundation	
[1] 10:15 – 10:55	**Ozone degradation of vulcanized rubber under high humidity condition** **Yuka Iwase** Polymer Technology Department, Chemicals Evaluation and Research Institute	
[2] 11:00 – 11:25	**Recent topics of polymer degradation mechanism on atmospheric exposure test and its environmental dependency** **Ryoma Kitagaki** Associate Professor , Hokkaido University	**Recent topics of polymer degradation mechanism on atmospheric exposure test and its environmental dependency** **Shin Watanabe** Suga Weathering Technology Foundation
[3] 11:25 – 11:50	**Study of light stability for colour photographic reflection prints under LED illumination** **Hideo Kita** Suga Weathering Technology Foundation	
	Lunch	
[4] 13:00 – 13:40	**A study of ultra-violet exposure using the fiber materials Under the Antarctic Ozone Hole** **Tekeshi Kikutani** Professor, Materials and Chemical Technology, Tokyo Institute of Technology	**A study of ultra-violet exposure using the collagen artificial skin Under the Antarctic Ozone Hole** **Tetsuya Takahashi** Professor, Faculty of Human sciences, Shimane University
[5] 13:45 – 14:45	**Acceleration of Laboratory Weathering with High Irradiances** **Artur Schönlein** ISO/TC61(Plastics)/SC6(Ageing, chemical and environmental resistance) Chair	
[6] 15:00 – 15:25	**Evaluation of Weathering Degradation of Outdoor Exposed Polymer using Indentation Method** **Yonezu Akio** Professor, Faculty of Science and Engineering, Chuo University,	
[7] 15:30 – 16:10	**Possibility of corrosion prediction from atmospheric environment data using AI** **Hideki Katayama** Field Director, Analysis and Evaluation Field, Research Center for Structural Materials, National Institute for Materials Science	
[8] 16:15 – 16:55	**Quantitative elucidation of the mechanism of prevention of weathering deterioration by HALS in automotive coating** **Hiroshi Kubota** Principal Engineer, Technical Research Center, Mazda Motor	
17:10 – 18:40	**Social gathering**	

[1] Yuka Iwase

Ozone degradation of vulcanized isoprene rubber was investigated by changing atmospheric humidity. Ozone exposure test of a carbon black filled isoprene rubber was carried out with ozone at 40 ℃, for 48 hours under relative humidity (RH) between 20 and 90%, after a strain of 20% stretching. Black powders appeared on the surface of the rubber after ozone exposure test at 80%RH, while they did not at 20%RH. It was found that the ozone degradation mechanism of the vulcanized isoprene rubber under high humidity conditions is deferent from that under low humidity conditions.

[2] Ryoma Kitagaki / Shin Watanabe

Degraded polymers on atmospheric exposure test are often discussed in comparing to the accelerated degraded polymers, however, polymer degradation mechanism on atmospheric exposure test and its environmental dependency have not been also investigated adequately. Recent topics of degraded polymers about atmospheric exposure test are reviewed and introduced.

[3] Hideo Kita

In recent years, LED are generally used in indoor lighting, however no studies have been reported about the light stability for colour photographic reflection prints under LED illumination. In order to standardize on ISO / TC42 (Photography), we experimented the difference in the degradation behavior with LED and xenon light source at this Working Group including the action spectra of printed material.

[4] Tekeshi Kikutani

Japanese fiber industry has technological advantages for developing new fibers. Especially in the field of high performance fibers, almost all types of high strength fibers in the market are being produced in Japan. On the other hand, it is known that most of high strength fibers have fragility against the exposure to day light. In this research, various types of high performance fibers provided by Japanese fiber companies were subjected to the outdoor exposure experiments in Antarctica. The results will be discussed from the view point of the total solar radiation and the difference in the opening of ozone hole in spring and autumn.

[4] Tetsuya Takahashi

Recently, environmental destruction has brought about the ozone hole in the upper sky of Antarctica and pouring short-wavelength UV on the ground. Our laboratory has conducted research on collagen sheets to evaluate the skin damage in humans caused by UV rays. We are also investigating its impact on the human skin by irradiating these sheets with artificial UV rays. Moreover, the inhibitory effects of UV-cut films are also under study. In fact, outdoor exposure experiments are currently being conducted in Antarctica. This lecture explains those experimental results.

[5] Artur Schönlein

The requirements for the environmental resistance of materials are constantly increasing. On the other hand, new products should be brought to market faster and faster. This makes a constant development and adaptation to climatic conditions necessary. In order to keep pace with the development of new materials, there is a constant search for ways to shorten current laboratory testing times. In principle, test time reductions can be achieved by intensifying the essential weather factors radiation and temperature, if it is ensured that the material degradation mechanism remains comparable with intensified size. ISO/TS 19022: 2016 describes a suitable test method with which it can be checked whether a material is suitable for the test with high irradiance. The technical requirements for a shortening of the test time with high irradiances are discussed. These are irradiance control, sample chamber and black panel temperature control, variation of the air flow rate and constant control of the sample chamber humidity. Some examples show that with intensified irradiance comparable test results are achieved, if certain boundary conditions are considered.

[6] Yonezu Akio

This study aims to evaluate weathering degradation of outdoor exposed polymers using an indentation test. Various degradation specimens were prepared with different exposure periods and exposure sites. It was found that the degradation specimens showed degree of yellowness increased with longer exposure period. In addition, by using FT-IR (Fourier Transform Infrared Spectroscopy), it is revealed that the molecular structure in polymer changes depending on the exposure period. Next, an indentation test was conducted to evaluate the mechanical properties of the degradation layer. It was found that the fracture toughness value decreases, showing brittle characteristic as the exposure period increased. We will discuss the relationship between molecular structure and fracture toughness value.

[7] Hideki Katayama

The possibility of corrosion prediction from atmospheric environment data such as temperature, relative humidity and amount of airborne sea salt utilizing Artificial Intelligence (AI) was investigated. The corrosion data and environmental data obtained by exposure tests at six sites in Japan is used as teaching data, and various algorithms of AI were compared to construct prediction model of corrosion rate. In addition, the validity of the prediction model was examined by comparing the estimated corrosion loss obtained by the prediction model from the atmospheric environment data with the corrosion loss obtained by the exposure test.

[8] Hiroshi Kubota

HALS is one of the important additives to prevent the weathering deterioration of the coating. Generally, HALS is considered to capture radicals that cause deterioration of the resin while changing the structure in the coating film by the Denisov cycle, and to maintain the deterioration preventing function of the coating resin until it deactivates. In this talk, we will describe the mechanism of preventing the deterioration of HALS, which has been clarified by quantifying the structural change of HALS by various analysis methods.