Highlights of the Papers in *Synthesiology* Volume 9 Issue 4 (Japanese version Nov. 2016)

Synthesiology is a journal that describes the objectives and social value of research activities that attempt to utilize the results in society, the specific scenarios and research procedures, and the process of synthesis and integration of elemental technologies. To allow the readers to see the value of the papers in a glance, the highlights of the papers characteristic to *Synthesiology* are extracted and presented by the Editorial Board.

Synthesiology Editorial Board

Development of a framework for risk tradeoff analysis of chemical substance substitution

— *An approach to risk assessment using relative comparison* —

Masashi GAMO *et al.*

While it is important to reduce the risks of chemical substances, if there is a possibility that substitute substances may cause different risks, the way to assess these risks is extremely important. Gamo (AIST) *et al.* present a methodology for introducing a common index to conduct relative quantitative comparison for the size of risks with differing factors, and the way to actually apply this method to risk assessment. The method is applied to existing case studies to actually investigate the effectiveness. These results can be applied to risk assessments of various fields, not limited to chemical substances, and this is a highly significant research.

A first empirical analysis of JIS lifespan

— *Implications for the review system of de jure standards* —

Suguru TAMURA

The Japan Industrial Standard (JIS) is a set of standards and references for various products in Japan, and while it is expected to contribute to innovation, the review of the standards is done according to regular schedule and lacks flexibility. Tamura (Research Institute of Economy, Trade and Industry) statistically calculates how the sustained period of standards differs, by utilizing various data such as the form of standard, technological category, and presence of ISO standards for about 4,500 JIS standards. Based on this result, he discusses the necessities for optimizing the review period of standards that may contribute to innovation and for achieving the efficiency of standard management. It is an insightful paper.

Development of EUPS for analyzing electronic states of topmost atomic layer

— *Materialization of laser-produced plasma source application and EUPS observed fascinating surface* —

Toshihisa TOMIE *et al.*

The topmost atom layer of substances is an important region that controls the catalyst functions, surface reactions, electric conductivity, and others, and its observation and control are immediate issues for many precision material design. Tomie (AIST) *et al.* have, over the years, engaged in the development of extreme ultraviolet-excited photoelectron spectroscopy (EUPS) that uses a plasma source produced by ultra-short pulse lasers, as well as surface measurement technology using this spectroscopy. This paper is a comprehensive report on the development and use of the technology. Specifically, extremely interesting cases of application are shown including observation of trace contamination of the topmost atom layer, a non-charge phenomenon of insulating films, electric conductivity, and catalyst activity. Since characteristic surface analysis that is difficult by other methods can be done, it is hoped that more users will utilize this method in the future.

A revolutionary technical development to revitalize Japanese forestry

— *A proposal for a portable tree felling manipulator to address specific properties of Japanese forestry* —

Yuko SHIRAI

Forestry in Japan is facing difficulty to be established as an industry, due to unique natural environment and social systems. Shirai (Waseda University) states the necessity of technological development that enables industrial autonomy, and presents demonstration experiments of an originally developed tree-felling manipulator and its potential for utilization in the industry. The paper is characteristic because the specific scenario and course are laid down for the revitalization of forestry, and a unique “technological design theory that thoroughly emphasizes the interaction with environment” is developed. The methodology can be applied to various other fields in the future, and is very interesting.

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