

Highlights of the Papers in *Synthesiology*

Synthesiology is a journal that describes the objectives, specific scenarios, and procedures of research activities that attempt to utilize the results in society, in particular, the process of synthesis and integration of elemental technologies for practical application. To allow the readers to see the value of the papers in a glance, the highlights of the papers that characterize *Synthesiology* have been extracted.

Synthesiology Editorial Board

Research paper: A new process to develop a hydraulic system adapted to biodegradable hydraulic oil for construction machinery

—Case study integrating component analyses and SysML description in failure analyses—

OHKAWA Satoshi *et al.*

From the perspective of environmental pollution, there are many countries that are enforcing the use of biodegradable hydraulic oil or bio-oil in construction machinery. However, the mechanism of failure when bio-oil is used is complex, and it was difficult to conduct analysis that led to countermeasures using conventional failure analyses such as FTA. This paper describes a scenario for using SysML and SafeML to explore the causes of failure when bio-oil is used, and thereby arriving at countermeasures.

Research paper: Development of a bovine sperm selection procedure for improvement of livestock fertility

NAGATA MariaPortia B. *et al.*

This is a description of the development of technology to sort highly motile spermatozoa in frozen sperms to improve cattle reproductivity. It is accomplished by gathering sufficient number of spermatozoa that can be used directly for artificial insemination using fluid handling technology. From the planning stage, a synthetic R&D was conducted, and it was assumed that this technology would be applied at sites of animal breeding where conditions such as individual animals and environment cannot be controlled. Moreover, good pregnancy rates were obtained in the demonstration test. It is an interesting paper in which the characteristic of spermatozoa that have advantage in conception was linked to their swimming form.

Research paper: Efforts toward commercialization of antifreeze proteins

ISHII Hirotaka *et al.*

The paper summarizes the efforts toward industrial application of antifreeze protein. It describes the course in which the scenario was changed from the efforts for practical use in the frozen foods field, to the efforts for practical use in new application fields. This paper was initially submitted as a “report” but was published as “research paper” since it showed the authors’ originality in the scenario and component elements (selection and integration).

Research paper: Measurement of mass of aerosol particles

EHARA Kensei *et al.*

The paper describes the conception of measurement principles of the aerosol particle mass analyzer to measure aerosol particle mass that fell in the range of 0.1 μg or less that could not be measured before. It also describes cases to which the developed device was used to evaluate the properties of various particles. As the definition of the kilogram was revised for the first time in 130 years, concerning the standard of mass, this is a timely paper in terms of pioneering a new measurement field.

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Aim of *Synthesiology*