Announcements

2018
Aug. 29 – Sep. 1
(Kyoto, Japan)

Sep. 12 – 14
(Sendai, Japan)
The 67th Annual Meeting of the Japan Society for Analytical Chemistry.*

2019
May 18 – 19
(Kitakyushu, Japan)
The 79th Symposium of the Japan Society for Analytical Chemistry.*

Sep. 11 – 13
(Chiba, Japan)
The 68th Annual Meeting of the Japan Society for Analytical Chemistry.*

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Fabrication of Microfluidic Cell Culture Devices Using a Consumer Laser Cutter

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An easy and cost-effective fabrication method of microfluidic cell culture devices is presented. A consumer laser cutter was employed to fabricate an acrylic mold possessing convex microchannel patterns. The mold was successfully fabricated by both laser engraving and laser cutting. A poly(dimethylsiloxane) substrate possessing recessed channel patterns was obtained after molding, and then bonded to the bottom part of a cell culture dish to complete the device. Human umbilical vein endothelial cells (HUVEC) were cultured in the microchannel and oriented along the direction of the fluid flow. Another device possessing a porous membrane sandwiched with a microchannel and a well was fabricated to co-culture HUVEC with HeLa cells. HUVEC reached confluence in the microchannel. However, the density of HUVEC decreased after co-culture with HeLa cells for 24 h. We expect that the present fabrication method can be utilized by researchers not familiar with microfabrication, and can accelerate the application of microfluidic devices to cell-based experiments.

Keywords: microfluidics; cell culture; laser cutter; porous membrane.
Electroanalytical Chemistry Based on the Theories of an Electrical Double Layer and a Reaction-diffusion Layer

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Electrochemically active (charged and/or redox active) species are under the influence of the electric field at the electrode surface. Electrochemical reactions vary the concentration of the electrochemically active species at the electrode surface from the bulk solution. The reaction fields affected by the electric potential and the chemical potential gradients are known as the electrochemical double layer and the diffusion layer, respectively. Three characteristic situations, such as the electrical double layer at a microporous electrode, potential-dependent adsorption of redox active ion, and bioelectrocatalytic reaction at a micro electrode, are modeled and numerically simulated. In a micro pore, the electrical double layers still overlap with each other. This overlapping causes a decrement of the double layer capacitance of the electrode. The adsorption of the charged redox active species at the electrode surface depends on the electrode potential. The maximum adsorption occurs around its standard redox potential. The mediator-type bioelectrocatalytic reaction at the microelectrode is able to provides a steadystate current. When the enzymatic reaction is extremely fast, the current is controlled by the diffusion of the substrate. Understanding the concentration profiles of the components in the system will provide an understanding of electrochemical reactions.

Keywords: electrical double layer; interface; electrocapillary curve; bioelectrocatalysis.

Measurement of the Transfer Factor of Rare Earth Elements from Paddy Soil to Brown Rice and Their Distribution in Rice Grain Using ICP-MS

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Due to the increase of industrial use of rare earth elements, their amounts in the environment should also increase in the future. To estimate the human intake of rare earth elements in the future, the soil-to-crop transfer factor (TF), which is defined as a concentration ratio between crop (mg kg$^{-1}$ dry) and soil (mg kg$^{-1}$ dry), is a useful tool. Unfortunately, however, only a limited number of TF data sets for rare earth elements was available for agricultural crops world widely (number of TF data ≤ 20). Because rice is a staple food in Japan, in this study, paddy soil-to-brown rice transfer of rare earth elements, i.e., La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Yb, and Lu (hereafter REE) were determined by measuring the concentrations in brown rice and associated soil sample sets collected from 98 sites throughout Japan. The soil and rice samples were digested separately and we measured their REE concentrations by ICP-MS; the measured values were used to calculate TF values of REE (number of TF data = 57 - 91). The obtained TF values distributed lognormally, so that the geometric mean (GM) for each REE was calculated. The GM of TF ranged from 4.2×10$^{-2}$ to 6.9×10$^{-3}$, and no significant difference was observed among REE. The dataset size increments provided greater confidence in them compared with the previous values. In brown rice grain, by comparing the GM of REE concentrations in brown rice and rice bran, it was clear that the concentrations of light REE in the rice bran part were higher than those in the white rice part; however, heavy REE tended to show only a slight increase in the rice bran compared to those in the white rice part.

Keywords: transfer factor; paddy field soil; rice bran; brown rice; lanthanides.
Crystal Structure and Hirshfeld Surfaces of (E)-1-(2-Hydroxyphenyl)-3-(5-methylthiophen-2-yl)prop-2-en-1-one

N. R. Sreenatha, B. N. Lakshminarayana, D. P. Ganesha, S. Vijayshankar, and S. Nagaraju

Pentanuclear Complex Formed between Dinuclear Nickel(II) Complexes and Sodium Ion

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