

Announcements

2021

April 16 – 19

(Taipei, Taiwan)

The Asian Conference on Analytical Sciences 2021 (ASIANALYSIS XV).

Contact: Organizing Committee of ASIANALYSIS 2021
(Website: <https://conferences.iam.s.sinica.edu.tw/ASIANALYSIS2020/home>).

May 22 – 23

(Yonezawa, Japan)

The 81st Symposium of the Japan Society for Analytical Chemistry.*

Aug. 22 – 27

(Osaka, Japan)

Joint Conference of 22nd International Society of Magnetic

Resonance Conference, 9th Asia-Pacific NMR Symposium (APNMR9), 60th Annual Meeting of the Nuclear Magnetic Resonance Society of Japan (2021), and 60th Annual Meeting of the Society of Electron Spin Science and Technology (ISMAR-APNMR-NMRSJ-SEST2021).

Contact: SMAR-APNMR 2021 Secretariat, JTB Communication Design Inc., Celestine Shiba Mitsui Bldg., 3-23-1 Shiba, Minato, Tokyo 105-8335, Japan (e-mail: ismar-apnmr2021@jtbcom.co.jp; Website: <https://www.ismar-apnmr2021.org/>).

Sep. 22 – 24

(Kobe, Japan)

The 70th Annual Meeting of the Japan Society for Analytical Chemistry.*

*Contact: The Japan Society for Analytical Chemistry, 1-26-2 Nishigotanda, Shinagawa, Tokyo 141-0031, Japan.

BUNSEKI KAGAKU
Vol. 69 No. 12 December, 2020

Special Articles: Analytical Chemistry for Sustainable Social Development

Accounts

- Coalescence of Oil Droplets and Collection of Vesicles by Optical Pressure**
 Yumeki Tani and Takashi Kaneta 665
- Analysis of Functional Water —An Environmentally Friendly Analytical Method Using an Alkaline Chloride Aqueous Solution—**
 Masaru Arai and Yuko Nishimoto 673

Research Papers

- Influence of Viscosity on Linear Dichroism Change in Magnetic Nanoparticles Under Damped Oscillating Magnetic Field**
 Masayori Suwa, Akira Uotani and Satoshi Tsukahara 679
- Application of Wavelength Dispersive XRF for Simple and Rapid Estimation of Fertilizer Contents Available in the Soil**
 Yurie Tani, Yuta Yamaguchi, Haruhi Yokota, Hirofumi Yamada, Naofumi Ohtsu and Masayuki Uto 685
- Development of Colorimetric Analysis with Smartphones-captured Images Based on RGB-spectrum Conversion Methods**
 Arinori Inagawa and Nobuo Uehara 693
- Carbon Isotope Composition and Its Variation of Particulate Organic Matter in River Waters from the Kuzuryu River System**
 Seiya Nagao, Masaki Kanamori and Shinya Ochiai 707

Technical Papers

- Development of a Paper-based Analytical Chip for the Detection of Bacterial 16S rRNA in Wastewater Samples**
 Meri Nakajima, Akihiko Ishida, Manabu Tokeshi and Hisashi Satoh 715
- Spectroelectrochemical Evaluation of the Formal Potentials of the Conducting Polymers**
 Yumi Yoshida, Emi Kusakabe, Mei Takami and Kohji Maeda 723

Notes

- Development of Lectin-immobilized Spongy Monoliths for Sub-classification of Exosome**
 Takuya Kubo, Seiya Kato, Asako Shimoda, Raga Ishikawa, Shin-Ichi Sawada, Yoshihiro Sasaki, Kazunari Akiyoshi and Koji Otsuka 731
- Optical Manipulation of Water Droplets in Air by a Double-beam Laser Trapping Technique**
 Yuta Tanaka, Yui Kohaku and Shoji Ishizaka 737
- Analysis and Survey of PM_{2.5} from a Biological Viewpoint at Kyushu University Ito Campus**
 Karin Miura, Sachiko Ide, Toyohiro Naito, Taisuke Shimada, Takao Yasui, Yoshinobu Baba and Noritada Kaji 741

Analytical Reports

- Evaluation of the Limiting Nutrient in Water of Lake Miyajima-numa by a Dilution Bioassay**
 Nobutake Nakatani, Kohei Ichizawa, Ryo Miyashita, Takumi Kiuchi, Tomohisa Shimauchi and Katsumi Ushiyama 747
- Development of Ultra-sensitive CE/MS and Its Application to Single Cell Metabolome Analysis**
 Takayuki Kawai 753

We are pleased to announce that Analytical Sciences administers the abstracts of selected papers published in Bunseki Kagaku. Bunseki Kagaku is an article magazine (monthly publication in Japanese) of The Japan Society for Analytical Chemistry. Bunseki Kagaku publishes peer-reviewed original, technical and review articles, analytical data and techno reports that pertain to various aspects of analytical chemistry. The insertion of the abstracts in Analytical Sciences will help readers all over the world to be aware of recent advances in all fields of analytical chemistry.

(The editorial committee of Bunseki Kagaku)

BUNSEKI KAGAKU

Vol. 69 No. 12 December, 2020

Special Articles: Analytical Chemistry for Sustainable Social Development

Coalescence of Oil Droplets and Collection of Vesicles by Optical Pressure

Yumeki TANI¹ and Takashi KANETA^{*1}

^{*} E-mail : kaneta@okayama-u.ac.jp

¹ Graduate School of Natural Science and Technology, Okayama University, 3-1-1, Tsushimanaka, Kita-ku, Okayama-shi, Okayama 700-8530

(Received July 21, 2020; Accepted August 17, 2020)

We demonstrated the utility of optical pressure in the manipulation of oil droplets and vesicles in the field of analytical chemistry. In order to realize chemical analysis in a limited small space, a method to capture and coalesce two oil droplets was developed using two laser beams. Three types of stabilizers for the formation of oil droplets were explored to achieve the coalescence of two droplets whereas polyethylene glycol (PEG) was the most suitable one among them. When using the oil droplets with PEG, the increase in temperature of the medium induced successful coalescence of two droplets. We also developed a method to collect liposomes, which are a model of artificial extracellular vesicles, using optical pressure. It was found that the collection efficiency was significantly improved by adding gold nanoparticles into the solution. This effect is due to thermal convection induced by the optical absorption of gold nanoparticles in solution and an enhancement of the optical pressure caused by binding between the vesicles and the gold nanoparticles. It was also elucidated that the binding was strongly related to the electrostatic interaction in addition to the hydrophobic interaction. Based on these findings, we achieved the collection of nanometer-sized vesicles and exosomes released by cells by optical pressure.

Keywords: optical pressure; oil droplet; liposome; exosome; gold nanoparticle.

Analysis of Functional Water
—An Environmentally Friendly Analytical Method
Using an Alkaline Chloride Aqueous Solution—

Masaru ARAI¹ and Yuko NISHIMOTO^{*1}

^{*} E-mail : y24moto@kanagawa-u.ac.jp

¹ Department of Chemistry, Faculty of Sciences, Kanagawa University, 2946, Tsuchiya, Hiratsuka-shi, Kanagawa 259-1293

(Received August 18, 2020; Accepted September 15, 2020)

As functional water, a dilute aqueous solution of alkali chloride was taken up. Analysis of electrolyzed water produced by electrolysis, and separation/concentration system using water above the eutectic point and below 0 °C were introduced. Electrolyzed water has a bactericidal effect due to the action of generated hypochlorous acid, but it has been shown that active oxygen other than hypochlorous acid is involved in the bactericidal action. It was also found that KCl contributes more to active oxygen than NaCl due to the influence of the alkali metal ions of the salt used as an electrolysis aid. A further investigation of suitable preparation methods for the application is required. We are developing a system that can separate and concentrate inorganic cations and small organic molecules by keeping the aqueous solution of alkali chloride at −10°C, which is higher than the eutectic point of alkali chloride and water and lower than the melting point of water. We are proceeding with a further research as an environmentally friendly analytical method that does not use harmful chemical substances.

Keywords: functional water; alkali chloride; eutectic mixture; hypochlorous acid.

BUNSEKI KAGAKU Vol. 69, No. 12, pp. 673–678 (2020)

Development of Colorimetric Analysis with Smartphones-captured
Images Based on RGB-spectrum Conversion Methods

Arinori INAGAWA^{*1} and Nobuo UEHARA^{**1}

^{*} E-mail : ainagawa@cc.utsunomiya-u.ac.jp

^{**} E-mail : ueharan@cc.utsunomiya-u.ac.jp

¹ Faculty of Engineering, Utsunomiya University, 7-1-2, Yoto, Utsunomiya-shi, Tochigi 321-8585

(Received September 9, 2020; Accepted October 15, 2020)

The RGB-based reproducing method for absorption spectra was applied to colorimetric analysis with smartphone-captured digital color images. The present study demonstrates the reproduction of the spectra of aqueous potassium permanganate coexisting with glucose under a basic condition, phenol red solutions under various pH conditions, and aluminum-eriochrome cyanine R complexes coexisting with cationic surfactants. The reproduced absorption spectra were coincided with the spectra obtained by conventional spectrophotometry with high accuracy. We also applied the present method to water quality tests of environmental water samples, which determined chemical oxygen demand values, pH values and the cationic surfactant concentration. We have confirmed that absorptions spectra were also reproduced even with the environmental water samples. Moreover, the results obtained from the reproduced spectra were almost identical to those obtained from the spectrophotometric spectra, showing the potential of the present method for on-site ratiometric analysis with smartphones. The present method would enable the smartphone-based ratiometric analysis without any monochromatizing equipment such as gratings and imaging spectrometers.

Keywords: RGB; smartphone-based analysis; spectrum reproduction; water quality test; colorimetric analysis.

BUNSEKI KAGAKU Vol. 69, No. 12, pp. 693–706 (2020)

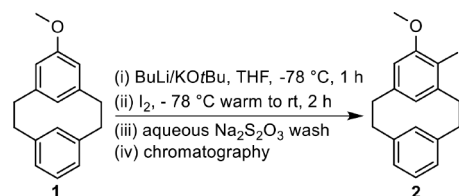
X-ray Structure Analysis Online Vol. 36, Part 11 (pp. 45 – 48)

The Japan Society for Analytical Chemistry's electronic-only journal for the concise crystal structure reports on all classes of compounds. Our webpage, <http://www.jsac.or.jp/cgi-bin/xraystruct/toc/>.

X-ray Struct. Anal. Online, **2020**, 36, 45.

Crystal Structure of *rac*-4-Iodo-5-methoxy[2.2]metacyclophane; A Rare Example of a Halogenated Metacyclophane with Planar Chirality

Marco BLANGETTI and Donal F. O'SHEA



X-ray Struct. Anal. Online, **2020**, 36, 47.

Crystal Structure of 5-Methoxyindirubin 3'-Oxime

Niina NAKAMURA, Yoshimi ICHIMARU, Koichi KATO, Makoto SANO, Hiromasa KUROSAKI, Kazuhiko HAYASHI, and Shinichi MIYAIRI

