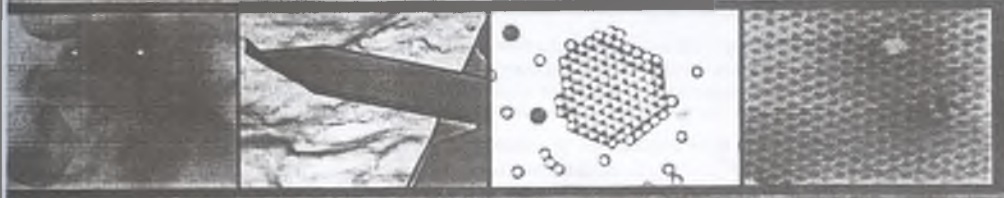
IACIS 2012



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S4P16-24 **Exchanges of sodium cholate and various length of oligo-DNA on carbon nanotube**
Ayaka INOUE[1], Yuichi KATO[1], Yasuro NIIDOME[1,2], Naotoshi NAKASHIMA[1,2,3]
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S4P16-25 **Size Effect of Au-Nanoparticles on the Response of Direct Electron Transfer Biosensor Carrying Horseradish Peroxidase/Au-Nanoparticle Nanocomplex Monolayer**
Yusuke OKAWA, Moeno SUMI, Takashi YAMAGUCHI, Fumiyuki SHIBA
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S4P16-26 **Surfactant Adsorption on Multi-Walled Carbon Nanotubes**
Wipawan MATTAVAKUL[1], Boonyarach KITIYANAN[1,2]
([1]Petrochemical and Petroleum college, Chulalongkorn University, [2]Center for Petroleum, Petrochemicals and Advanced Materials, Chulalongkorn University)

S4P16-27 **Cyclic Voltammograms of Au-Ag Core-Shell Nanorods-modified ITO Plate and Their Optical Properties**
Yuki HAMASAKI[1], Yukiko TSURU[1], Ayaka KIYA[1], Naotoshi NAKASHIMA[1,2,3], Yasuro NIIDOME[1,2]
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S4P16-28 **Flocculation of Ag nanoparticles for enormous surface enhanced Raman scattering using electrostatic and chemical interaction**
Masayuki FUTAMATA, Yingying YU, Toru YAJIMA
(Saitama University)

S4P16-29 **Surface condition and properties of copper fine particles prepared from CuO**
Yoshiki UCHIDA, Takashi NARUSHIMA, Tetsu YONEZAWA
(Faculty of Engineering, Hokkaido University)

S4P16-30 **Fabrication of zinc oxide particles in the presence of anionic surfactants**
Hirobumi SHIBATA[1], Takayuki KAWAI[1], Tomohiro KANZAKI[1], Taku OGURA[2], Keishi NISHIO[2], Hideki SAKAI[2], Masahiko ABE[2], Kazuaki HASHIMOTO[1]
([1]Chiba Institute of Technology, [2]Tokyo University of Science)

S4P16-31 **Fabrication of Single Metal-Single Quantum Dot Complex Nanostructures for Control of Single-Photon Emission**
Hiroyuki NAIKI[1], Akito MASUHARA[2], Sadahiro MASUO[3], Tunenobu ONODERA[1], Hitoshi KASAI[1], Hidetoshi OIKAWA[1]
([1]Tohoku Univ., [2]Yamagata Univ., [3]Kwansei Gakuin Univ.)

S4P16-32 **Ultrafast Excited-state Dynamics of Aqueous Colloid of C_{60} Nanoparticles**
Yukihide ISHIBASHI[1], Miya ARINISHI[1], Hiroshi MIYASAKA[2], Tsuyoshi ASAHI[1]
([1]Ehime Univ., [2]Osaka Univ.)

S4P16-33 **Formation of raspberry-like and smooth silica shells in vesicle-template synthesis**
Haruyuki ISHII, Kumi SATO, Daisuke NAGAO, Mikio KONNO
(Tohoku Univ.)

S4P16-34 **Chain Dimension of a Polycation in Solution and Immobilized Brush States**
Tatsuya ISHIKAWA[1], Moriya KIKUCHI[2], Motoyasu KOBAYASHI[2], Atsushi TAKAHARA[1,2,3]
([1]Graduate School of Engineering, Kyushu University, [2]JST, ERATO Takahara Soft Interfaces Project,
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S4P16-35 **Nanoprotonics in polymer thin films**
Yuki NAGAO[1,2]
([1]Kyoto University, [2]JST PRESTO)

S4P16-36 **Polymer-based photocoupling agent for the effecient immobilization of nanomaterials including nanoparticles and graphene**
Takuya KUBO[1], Mingdi YAN[2]
([1]Tohoku University, [2]University of Massachusetts Lowell)

S4P16-37 **Bio- and nanosorbents of metall ions**
Kuralay KORZHINBAEVA, Sagdat TAZHIBAYEVA, Ayzhan ORAZYMBETOVA, Kuanyshbek MUSABEKOV, Mukhambetkhali BURKITBAEV, Ayman TURGUNBAEVA
(Al-Farabi Kazakh National University)

S4P16-38 **Analysis of environmental polycyclic aromatic hydrocarbon at the water surface by photoionization methods using laser and synchrotron radiation**
Miki ISODA, Yuki MAEDA, Toshio ISHIOKA, Akira HARATA
(Kyushu Univ.)

S4P16-39 **Reversible adhesion of biodegradable hydrogels utilizing polyion complex formation**
Wataru KAWAI, Taka-Aki ASOH, Akihiko KIKUCHI
(Tokyo Univ. of Sci.)

S4P16-40 **The interface stability of adhered stimuli-responsive hydrogels prepared by electrophoresis**
Eri KAWAMURA, Taka-Aki ASOH, Akihiko KIKUCHI
(Department of Materials Science and Technology, Faculty of Industrial Science and Technology, Tokyo University of Science)

S4P16-41 **Microhydrodynamics simulation of single-collector granular filtration**
Albert S. KIM[1], Scok T. KANG[2], Min J. KIM[2], Yong T. LEE[2]
([1]University of Hawaii at Manoa, [2]Kyung Hee University)

S4P16-42 **Microscope Measurements of Lateral Diffusion of Fluorescent Molecules at Liquid/Liquid Interfaces by Total Internal Reflection-Fluorescence Recovery after Photobleaching**
Naoki SHINOMORI[1], Satoshi TSUKAHARA[2], Yasuaki OKAMOTO[1], Terufumi FUJIWARA[1]
([1]Hiroshima Univ., [2]Osaka Univ.)

S4P16-43 **The near infrared absorption properties of $W_{18}O_{49}$**
Chongshen GUO, Shu YIN, Tsugio SATO
(Tohoku Univ)

S4P16-44 **Acidity effects on the fluorescence properties of rhodamine B molecules at the air/water interface studied with a confocal fluorescence microscopy**
Akira HARATA, Yasushi IMANISHI
(Kyushu Univ.)

Bio- and nanosorbents of metall ions

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Abstract

The possibility of use of a diatomite for separation of Cu^{2+} and Pb^{2+} ions from solutions is shown. It is established that metals ions separation degree makes 91,1-92,1%. For increase of degree of water treating it is offered to use immobilizing microorganisms cells on a diatomite. Thus Cu^{2+} and Pb^{2+} ions separation degree reaches 99,8 %.

Experiences on Cu and Pb ions separation degree with the help immobilizing cells have shown that of Cu and Pb metals ions separation degree reaches 99,8%. Unlike a diatomite, microorganisms cells are contained by the big variety of the functional groups capable to interaction with ions of metals. These are carboxylic, amino, phosphatic, sulphatic, etc. groups. Obviously, they also are at the bottom of high metals ions separation degree.

Keywords: Diatomite, Microorganisms cells, *Pseudomonas mendocina H3* microorganisms cells, Immobilization, Separation degree.

1. Introduction

The problem of sewage treatment of industrial undertakings from a waste harmful to ability to live is one of actual problems of the present. The maintenance in them of ions of heavy metals that demands working out of ways of clearing with high degree of extraction is especially great. The most widespread way of the decision of the given problem is preparation of sorbents with high sorption ability. In this connection the purpose of the present research was optimization of conditions of Cu^{2+} and Pb^{2+} ions extraction from solutions by sorbents on the basis of a diatomite and microorganisms cells.

2. Experimental

In work a diatomite of the Mugodzhar deposit of the Aktyubinsk area and *Pseudomonas mendocina H3* microorganisms cells used. Concentration of cells made $1 \cdot 10^7$ cells/ml.

Electronic-microscopic researches have shown presence on a surface of a diatomite of a time with a size from 60 nanometers to 1 micron. The average size of particles of a diatomite is made by 65-70 microns, and a specific surface – 46,2 m^2/g, the size of cells makes 0,1-1,0 microns, therefore a diatomite can serve as the convenient carrier of cells.

3. Results and discussion

By working out of ways of clearing of solutions from chemical compounds most an important point is selection of optimum parities between adsorbed substance and an adsorbent. Thereupon we use a wide range of concentration of salts $CuSO_4$ and $Pb(NO_3)_2$ from 10^{-5} mole/l to 10^{-1} mole/l. Experiences on extraction of ions Cu^{2+} and Pb^{2+} from these solutions a diatomite have shown that with growth of concentration of salts from 10^{-5} mole/l to 10^{-1} mole/l degree of extraction of ions of metals changes from 92,1 to 15,6 % in case of ions Cu^{2+} and from 91,1 to 20,3 % - in case of Pb^{2+}. The basic components of a diatomite is SiO_2 (~65,83%) and Al_2O_3 (~8,66%). Fe, K, Mg, Na, Ni and Ca oxides contained within 0,5–3,0%. It is natural to assume that interactions silanol-groups with ions of metals will be defining interactions in system.

Influence of medium pH on Cu^{2+} and Pb^{2+} ions separation degree is studied. As introduction in a NaOH solution will be to lead to formation hydroxides of metals, it was expedient to conduct researches in the sour environment. It is shown that decrease ions separation of lead on 8%. Cu^{2+} ions separation degree doesn't undergo special changes in these conditions.

The reached Cu and Pb ions separation degree isn't satisfactory for diatomite use at sewage treatment from the specified ions of metals.

Therefore for increase of metals ions separation degree it is offered to use immobilizing on a diatomite of *Pseudomonas mendocina H3* microorganisms cells.

4. Conclusions

Experiences on Cu and Pb ions separation degree with the help immobilizing cells have shown that of Cu and Pb metals ions separation degree reaches 99,8%. Unlike a diatomite, microorganisms cells are contained by the big variety of the functional groups capable to interaction with ions of metals. These are carboxylic, amino, phosphatic, sulphatic, etc. groups. Obviously, they also are at the bottom of high metals ions separation degree.

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