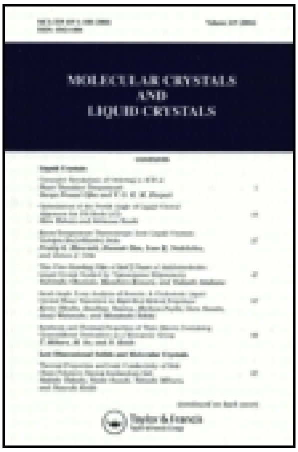

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A Study on the Deposition and Surface Structure Analysis of LB Thin Film

Jin-Won Song [a] , Bong-Ju Lee [b] , Kyung-Sup Lee [b] , Hal-Bon Gu [c] , Yuan Shiying [d] & Mitsumasa Iwamoto [e]

[a] Dept. of Electrical and Electronic Eng., Dong Shin University, grad., 252 daeho-dong, NaJu-city, chonnam, 520-714, Korea

[b] Dept. of Electrical and Electronic Eng., Dong Shin University, 252 daeho-dong, NaJu-city, chonnam, 520-714, Korea

[c] Dept. of Electrical Eng., Chonnam National University, 300 Yongbong-dong, Buk-ku, Gwang-ju city, 500-757, Korea

[d] Jiaozuo Institute of Technology, Jiefang Road, Jiaozuo City, Hename Province, P. R. China

[e] Dept. of Physical Electronics, Tokyo Institute of Technology, 2-12-1 O-okayama, Meguro-ku, Tokyo, 152-8552, Japan

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JIN-WON SONG[a], BONG-JU LEE[b], KYUNG-SUP LEE[b], HAL-BON GU[c], YUAN SHIYING[d] and MITSUMASA IWAMOTO[e]

[a]*Dept. Of Electrical and Electronic Eng., Dong Shin University, grad., 252 daeho-dong, NaJu-city, chonnam, 520-714, Korea,*
[b]*Dept. of Electrical and Electronic Eng., Dong Shin University, 252 daeho-dong, NaJu-city, chonnam, 520-714, Korea,*
[c]*Dept. of Electrical Eng. Chonnam National University, 300 Yongbong-dong, Buk-ku, Gwang-ju city, 500-757, Korea,*
[d]*Jiaozuo Insitute of Technology, Jiefang Road Jiaozuo City Henam Province, P. R. China and*
[e]*Dept. of Physical Electronics, Tokyo Institute of Technology, 2-12-1 O-okayama, Meguro-ku, Tokyo 152-8552, Japan*

Abstract The physicochemical properties of the LB films surface structure has been studied by AFM. We give pressure stimulation into organic thin films and then manufacture a device under the accumulation condition that the state surface pressure is 2, 10, 30[mN/m](gas state, liquid state, solid state). Formation that prevent when gas phase state and liquid phase state measure but could know organic matter that molecules form equal and stable film when molecules were not distributed evenly, and accumulated in solid state only.

INTRODUCTION

In the Langmuir-Boldgett(LB) technique, a monolayer on the water surface is transferred on to a substrate, which is raised and dipped through the surface, and one can obtain multilayers in which constituent molecules periodically are arranged in layer. The LB technique has attracted considerable interest in the fabrication of electrical and electronic device, *e.g.*. Many researchers have investigated the electrical properties of monolayer and multiplayer films. [1][2]

Before grasp electrical and electronic properties, that observe surface structure of LB film and grasp the properties is important.

Insoluble monolayers on water surface exhibit various phases, and they are interesting as two-dimensional and interfacial system in the fields of physics, chemistry and electronics.

In this paper, we give pressure stimulation into organic thin films and then manufacture a device under the accumulation condition that the state surface pressure is 2, 10, 30[mN/m](gas state, liquid state, solid state). The physicochemical properties of the LB films were on the surface of pure water are studied by AFM. [3]

EXPERIMENT

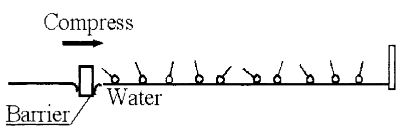


FIGURE 1. LB trough

Figure 1 shows a model of floating monolayer on a water surface. For simplicity, we confine our discussion to monolayers in the isotropic polar orientational phase. Monolayers of arachidic acid were spread from dilute chloroform solutions (0.2 *mmol*) onto the surface of pure water.

Arachidic acid was spread on pure water(pH 6.0, 18.2 MΩ cm) and maintained at 20 ℃. After a monolayer was rested for 5 minutes, the monolayer was compressed at a compression speed of 40 mm/min. π-A were measured during monolayer compression.

The AFM observations have been done with an AFM(Digital Instrument Nano Scope Ⅲ) along with estimation of surface roughness.

RESULTS AND DISCUSSION

Figure 2 shows the surface pressure-area(π-A) isotherm of arachidic acid in the whole compress process, which are obtained by a Wilhelmy surface pressure measurement technique. The Arachidic acid films during compression with in the range A=56-19Å^2 before the initial rise in surface pressure. The surface pressure change was generated at A=24 Å^2 and see gas state(56-24 Å^2), liquid state(24-20 Å^2), solid state(20-19 Å^2).

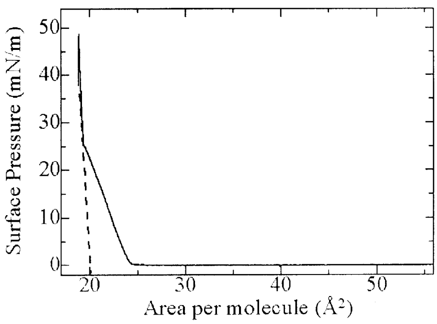
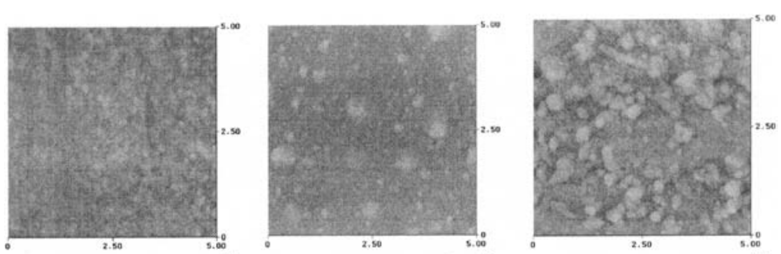


FIGURE 2. π-A isotherm

Figure 3 shows a surface morphology of Arachidic acid film obtained with the AFM. The AFM image consists of 5μm. The stable images are probably due to a strong interaction between the monolayer film and glass substrate. We are unable to obtain molecule resolution in images of the films but did see a marked contrast between images of the bare substrate and those with the network structure film deposited onto it. Formation that prevent when gas phase state and liquid phase state measure but could know organic matter that molecules form equal and stable film when molecules were not distributed evenly, and accumulated in solid state only.



(a) 2mN/m (b) 10mN/m (c) 30mN/m

FIGURE 3. AFM image by surface pressure

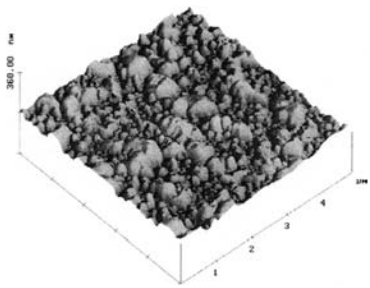


FIGURE 4. AFM image

Figure 4 shows are roughness result of LB films surface that deposition by solid state. Distinction of molecule border side was not clear, and could know that roughness appears greatly. Also, Image of LB film could know that is displaying very big and irregular form.

CONCLUSION

The LB films during barrier compression with the initial rise in surface pressure. The surface pressure change was generated at A=24 Å^2 and see gas state(56-24 Å^2), liquid state(24-20 Å^2), solid state(20-19 Å^2). We give pressure stimulation into organic thin films and then manufacture a device under the accumulation condition that the state surface pressure is 2, 10, 30[mN/m](gas state, liquid state, solid state).

The stable images are probably due to a strong interaction between the monolayer film and glass substrate. Formation that prevent when gas phase state and liquid phase state measure but could know organic matter that molecules form equal and stable film when molecules were not distributed evenly, and accumulated in solid state only.

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