



# TRAINING AND DIALOGUE PROGRAMS

GENERAL INFORMATION ON

**SOLAR POWER GENERATION TECHNOLOGY**

**集団研修「太陽光発電エネルギー技術」**

***JFY 2011***

**<Type: Solution Creation / 類型: 人材育成普及型>**

**NO. J11-00720 / ID. 1180236**

**From June 27th, 2011 to September 7, 2011**

This information pertains to one of the Training and Dialogue Programs of the Japan International Cooperation Agency (JICA), which shall be implemented as part of the Official Development Assistance of the Government of Japan based on bilateral agreement between both Governments.

# ***I. Concept***

## **Background**

From the viewpoint of global environment problems, effective use of natural energy has become a common global issue together with the promotion of renewable energy use. The importance of energy diversity is increasing owing to energy security issues. Among renewable energy sources, solar power generation is expected to be a promising growth industry in a low carbon society, and its demand is expanding as performance is improved by recent technological developments. Solar power generation systems consist of solar panels, controllers, and storage batteries, and they generate electric power from solar energy. Since the technology is relatively simple to handle, solar power generation is widely prevailing. However, inadequate installment, maintenance and management have become problems at many sites, so that reinforcement of technological guidance by the government and related institutions is expected.

Japanese resources depend heavily on imports and the nation has been making efforts to develop alternative energy. Japan started technological development of renewable energy a quarter-century ago and it has now become a world leader in the field of solar power generation through collaborations between industry, government and academia.

Electrification in the off-grid rural areas is our concern. There are high expectations for the effective use of solar radiation in the region. Based on Japanese solar power generation technology, this program offers a place of mutual study among participants engaged in electrification based mainly on solar power generation.

## **For what?**

This program aims at learning necessary knowledge and techniques to adequately introduce, promote, maintain and manage solar power generation for the effective use of solar energy, especially solar home system for the electrification in rural areas.

## **For whom?**

This program is intended for engineers who are in charge of solar power generation at governmental organizations, public electric power corporations, and so on

## **How?**

Participants will have the opportunity to attend lectures, participate in experiments, practical training, visits to and training at private enterprises, discussions, and presentations on the technology of solar power generation, storage, control, electricity consumption, etc. In this program, participants will learn from each other's experience combined with Japanese technology. Through these activities, participants will acquire systematic techniques for solar power generation as well as an understanding of the

prospects and issues concerning the effective use of solar energy in their own countries.

## ***II. Description***

**1. Title (J-No.): SOLAR POWER GENERATION TECHNOLOGY (J11-00720)**

- Here with, we would like to inform that there might be change in course contents of the above mentioned course due to the fluid situation of the budget allocation under the recent circumstances of East Japan Great Earthquake on Mar. 11<sup>th</sup>.

**2. Period of program**

**Duration of whole program:** June 2011 to March 2012  
**Phase in Japan:** June 27 2011 to September 7, 2011  
**Finalization Phase:** October 2011 to March 2012  
(in a participant's home country)

**3. Target Countries**

BOLIVIA, BURUNDI, FIJI, MALAWI, MALDIVES, SRI LANKA, TAJIKISTAN, TONGA

**4. Eligible / Target Organization**

This program is intended for government ministries, public electricity power corporations, universities and so on that are in charge of introduction, promotion, maintenance, and management of solar power generation for the electrification in rural areas.

**5. Total Number of Participants**

9 participants

**6. Language to be used in this program:** English (including English translated from Japanese through interpreters)

**7. Program Objective:**

Participants will be able to understand the theory and practice of solar power generation and apply them to business for the introduction, promotion, maintenance, and management of stand-alone solar power generation systems.

**8. Overall Goal**

Solar power generation will be adequately introduced, promoted, maintained and managed for the effective use of solar energy for electrification in off-grid rural areas.

## 9. Expected Module Output and Contents:

This program consists of the following components. Details on each component are given below:

Objective	Subject	Contents	Schedule (day)		
			Lecture	Practice	Field study
To know the Japanese basic information	General briefing	Japanese politics, economy, culture, history Japanese language practice	2	3	
To understand the science and technology underlying solar power generation system and its application as a primary source of electricity	Part I Fundamentals	(1) Solar Cells (i) fundamentals of semiconductor physics related to optical properties (ii) nature of sunlight (iii) semiconductor technology (iv) characteristics of solar cells – spectral response and efficiency – (2) Batteries (i) fundamentals of chemistry and electrochemistry (ii) storage batteries – charge and discharge – (iii) corrosion (3) Electronics and electric engineering (i) fundamentals of electronics (ii) DC/AC inverter (iii) controller – combining solar cells with batteries – (iv) lighting system – fluorescent & LED lamp – (4) Environmental technology; solar movement, energy from sunlight, effective use of solar energy and changes in climate (5) Planning; practical application of solar power generation in living and working places	16	4	0
	Part II Engineering	(1) Manufacturing process of solar batteries (i) amorphous silicon (ii) polycrystalline silicon (iii) other compounds (2) Manufacturing lead-acid batteries (3) Design, fabrication, examination and operation of solar power generation system (4) Solar house with control system – set-up and its maintenance –	1	1	1
	Part III Study Tours	(1) Solar house, Building, and/or “mega” city (2) Power station (3) Wind farms		3	

	Part IV Practical training to understand solar system	(1) Technique to characterize solar cells (2) Technique to examine or maintain storage batteries (3) Technique to control the operation of solar cells combined with storage batteries and DC/AC inverter (4) Practices in electronics – converter, inverter and regulator – (5) Practice in optical properties of semiconductors – photovoltaic effect – (6) Practices in the conceptual design of stand-alone solar power generation system (Solar home system)	20 (including 2.5-3 days for report making)
		Total	51

## **(2)Finalization Phase in a participant's home country**

*Participants produce final outputs by making use of their experience or knowledge acquired from this program.*

Expected Module Output	Expected Module Output
To formulate a final report	Final report will be submitted by February 2012 to respective country's JICA office or JICA Osaka International Center

### **10. Follow-up Cooperation by JICA:**

In this workshop, JICA might extend follow-up support to participating organizations that intend to develop the result of the project further. Please note that the support shall be extended selectively based on proposals from the participating organizations.

Further Information:

URL <http://www.jica.go.jp/english/operations/schemes/tech/follow/>

### ***III. Conditions and Procedures for Application***

#### **1. Expectations for the Participating Organizations:**

- (1) This program is designed primarily for organizations that intend to address specific issues or problems identified in their operation. Participating organizations are expected to use the project for those specific purposes.
- (2) This program is enriched with contents and facilitation schemes specially developed in collaboration with relevant prominent organizations in Japan. These special features enable the project to meet specific requirements of applying organizations and effectively facilitate them toward solutions for the issues and problems.
- (3) Participating organizations are expected to make the best use of the results achieved by their participants in Japan by carrying out the activities of the Finalization Phase described in section II -9.

#### **2. Nominee Qualifications:**

Applying Organizations are expected to select nominees who meet the following qualifications.

##### **(1) Essential Qualifications**

- 1) **Current Duties:** be engineers working for solar power energy-related government ministry, electric power public corporation, university, and other public organization
- 2) **Experience in the relevant field:** have two (2) or more years' experience related to solar power generation,
- 3) **Age:** be between the ages of twenty-five (25) and forty-five (45) years
- 4) **Educational Background:** have a bachelor's degree of science and/or engineering, or equivalent thereof, in a field related to this program,
- 5) **Language:** have a sufficient command of spoken and written English,
- 6) **Health:** must be in good health, both physically and mentally, to participate in the Program in Japan.  
Pregnant participants are strictly requested to complete the required procedures before departure in order to minimize the risk for their health. The procedures include ①letter of the participant's consent to bear economic and physical risks ②letter of consent from the participant's supervisor ③letter of consent from your Embassy in Japan, ④medical certificate. Please ask National Staffs in JICA office for the details.
- 7) to observe Japanese laws and ordinances. If there is any violation of said laws and ordinances participants may be required to return part or all of the training expenditure depending on the severity of said violation.
- 8) Must not be serving any form of military service.

### 3. Required Documents for Application

- (1) **Application Form:** The Application Form is available at the respective country's JICA office or the Embassy of Japan.
- (2) **Job report:** to be submitted with the application form. Fill in Attachment of this General Information, and submit it along with the Nomination Form.

### 4. Procedure for Application and Selection :

#### (1) Submitting the Application Documents:

Closing date for application to the JICA Center in JAPAN: **May 20th, 2011**

**Note: Please confirm the closing date set by the respective country's JICA office or Embassy of Japan of your country to meet the final date in Japan.**

#### (2) Selection:

After receiving the document(s) through due administrative procedures in the respective government, the respective country's JICA office (or Japanese Embassy) shall conduct screenings, and send the documents to the JICA Center in charge in Japan, which organizes this project. Selection shall be made by the JICA Center in consultation with the organizations concerned in Japan based on submitted documents according to qualifications. *The organization with intention to utilize the opportunity of this program will be highly valued in the selection.*

#### (3) Notice of Acceptance

Notification of results shall be made by the respective country's JICA office (or Embassy of Japan) to the respective Government by **not later than June 3, 2011.**

### 5. Conditions for Attendance:

- (1) to observe the schedule of the program,
- (2) not to change the program subjects or extend the period of stay in Japan,
- (3) not to bring any members of their family,
- (4) to return to their home countries at the end of the program in Japan according to the travel schedule designated by JICA,
- (5) to refrain from engaging in political activities, or any form of employment for profit or gain,
- (6) to observe the rules and regulations of their place of accommodation and not to change the accommodation designated by JICA, and
- (7) to participate the whole program including a preparatory phase prior to the program in Japan.

## IV. Administrative Arrangements

### 1. Organizer:

- (1) **Name:** JICA Osaka International Center
- (2) **Contact:** Ms. Megumi KATO ([osictt2@jica.go.jp](mailto:osictt2@jica.go.jp))  
with CC to; [jicaosicp-kensyu2@jica.go.jp](mailto:jicaosicp-kensyu2@jica.go.jp)

### 2. Implementing Partner:

- (1) **Name:** Graduate School of Engineering, Osaka City University (OCU)
- (2) **URL:** <http://www.osaka-cu.ac.jp/english/academics/eng.html>
- (3) **Remark:** The Graduate School of Engineering, Osaka City University established in 1949, was reorganized in 2002 to respond to the recent rapid progress in natural science and technology. The reorganized Graduate School comprises four departments with 50 leading research fields.

### 3. Travel to Japan:

- (1) **Air Ticket:** The cost of a round-trip ticket between an international airport designated by JICA and Japan will be borne by JICA.
- (2) **Travel Insurance:** Term of Insurance: From arrival to departure in Japan. The traveling time outside Japan shall not be covered.

### 4. Accommodation in Japan:

JICA will arrange the following accommodations for the participants in Japan:

JICA Osaka International Center (JICA OSAKA)  
Address: 25-1 Nishi-Toyokawa-cho, Ibaraki-shi, Osaka 567-0058, Japan  
TEL: 81-72-641-6900 FAX: 81-72-641-6910  
(where "81" is the country code for Japan, and "72" is the local area code)

If there is no vacancy at JICA OSAKA, JICA will arrange alternative accommodations for the participants. Please refer to facility guide of JICA OSAKA at its URL, <http://www.jica.go.jp/english/contact/domestic/>

### 5. Expenses:

The following expenses will be provided for the participants by JICA:

- (1) Allowances for accommodation, living expenses, outfit, and shipping
- (2) Expenses for study tours (basically in the form of train tickets).
- (3) Free medical care for participants who become ill after arriving in Japan (costs related to pre-existing illness, pregnancy, or dental treatment are not included)
- (4) Expenses for program implementation, including materials  
For more details, please see p. 9-16 of the brochure for participants titled "KENSU-IN GUIDE BOOK," which will be given to the selected participants before (or at the time of) the pre-departure orientation.

### 6. Pre-departure Orientation:

A pre-departure orientation will be held at the respective country's JICA office (or

Japanese Embassy), to provide participants with details on travel to Japan, conditions of the workshop, and other matters.

## ***V. Other Information***

### **1. DEVELOPMENT EDUCATION PROGRAMME:**

The purposes of the International Cooperation Program of JICA are not only to share Japanese knowledge, experience and ideas with participating countries, but also to promote mutual understanding between participating countries and Japan. The Japanese government recognizes the importance of citizen participation in its International Cooperation Program and has thus recently placed a greater emphasis on this aspect of the Program. With this objective, JICA collaborates with schools and local governments as well as various kinds of community-based organizations to expose the members to the rich heritages of foreign cultures represented by participants, as a precious first step to promote international exchange and cooperation.

To provide a stronger foundation for these activities, JICA has been conducting a Development Education Program for Japanese citizens in all training courses and seminars it offers. Participants are encouraged to bring any materials necessary to introduce the cultural heritages and/or natural histories of their own countries, such as national costumes, musical instruments, works of art, photographs, and so on. This program is scheduled to start on the first Thursday following the participants' arrival in Japan.

## **VI. ANNEX:**

### **Job Report**

(The completed questionnaire should be sent together with an Application Form.)

Country:

Name of applicant:

Name of organization:

Your email address:

#### **< Information of the participant >**

(1) Please draw a detailed chart of your organization and indicate your position in it as well as the number of persons in each department, division, section, work team, etc.

(2) Please give a detailed description as to the following items (as specific as possible):

a) Your present position and the kind of work you are engaged in.

b) Your career since completing your education, with particular reference to experience in electricity.

c) Your educational record in electricity, physics, chemistry, or equivalent. Write your specific degree awarded in university.

(3) Please explain why you are applying for this course, i.e., solar power generation and application technology.

#### **< Information on your country >**

(1) Please describe the national energy plan specific to the solar power generation.

(2) For an average household in your country, state the main uses of electricity and average monthly electricity consumption.

(3) For each month of the year, state the average number of clear days and average number of hours of sunshine recorded in your country.

(4) Enclose 2-3 photographs each of your country's traditional style of dwelling and typical modern dwelling.

## *For Your Reference*

### **JICA and Capacity Development**

The key concept underpinning JICA operations since its establishment in 1974 has been the conviction that “capacity development” is central to the socioeconomic development of any country, regardless of the specific operational scheme one may be undertaking, i.e. expert assignments, development projects, development study projects, training programs, JOCV programs, etc.

Within this wide range of programs, Training Programs have long occupied an important place in JICA operations. Conducted in Japan, they provide partner countries with opportunities to acquire practical knowledge accumulated in Japanese society. Participants dispatched by partner countries might find useful knowledge and re-create their own knowledge for enhancement of their own capacity or that of the organization and society to which they belong.

About 460 pre-organized programs cover a wide range of professional fields, ranging from education, health, infrastructure, energy, trade and finance, to agriculture, rural development, gender mainstreaming, and environmental protection. A variety of programs and are being customized to address the specific needs of different target organizations, such as policy-making organizations, service provision organizations, as well as research and academic institutions. Some programs are organized to target a certain group of countries with similar developmental challenges.

### **Japanese Development Experience**

Japan was the first non-Western country to successfully modernize its society and industrialize its economy. At the core of this process, which started more than 140 years ago, was the “*adopt and adapt*” concept by which a wide range of appropriate skills and knowledge have been imported from developed countries; these skills and knowledge have been adapted and/or improved using local skills, knowledge and initiatives. They finally became internalized in Japanese society to suit its local needs and conditions.

From engineering technology to production management methods, most of the know-how that has enabled Japan to become what it is today has emanated from this “*adoption and adaptation*” process, which, of course, has been accompanied by countless failures and errors behind the success stories. We presume that such experiences, both successful and unsuccessful, will be useful to our partners who are trying to address the challenges currently faced by developing countries.

However, it is rather challenging to share with our partners this whole body of Japan’s developmental experience. This difficulty has to do, in part, with the challenge of explaining a body of “tacit knowledge,” a type of knowledge that cannot fully be expressed in words or numbers. Adding to this difficulty are the social and cultural systems of Japan that vastly differ from those of other Western industrialized countries, and hence still remain unfamiliar to many partner countries. Simply stated, coming to Japan might be one way of overcoming such a cultural gap.

JICA, therefore, would like to invite as many leaders of partner countries as possible to come and visit us, to mingle with the Japanese people, and witness the advantages as well as the disadvantages of Japanese systems, so that integration of their findings might help them reach their developmental objectives.

# **Welcome to JICA Osaka**

**Osaka International Center of Japan International Cooperation Agency (JICA Osaka) extends a hearty welcome of all JICA participants.**

## **1. Location of the centre in the Kansai region**

**JICA Osaka is located in Ibaraki City, Osaka prefecture, in the heart of the Kansai region. Ibaraki lies close to the ancient cultural centers of Kyoto and Nara, and to the commercial, industrial and economic center of Osaka, and the city of Kobe.**

## **2. Orientation Programme & Japanese Language Course**

**(1) The four days after arrival at JICA Osaka are dedicated to an orientation programme, during which participants are introduced to JICA Osaka and its facilities, attend lectures on Japan's economy, society and culture, and participate in an international exchange programme with local communities.**

**(2) It is desirable that participants acquire basic Japanese daily conversations for use in communication with training institution personnel and in other situations outside the scope of their technical training. JICA Osaka therefore offers: Japanese language course held in the evenings.**

## **3. Weekend Recreational Program**

**Occasionally, at the weekends, JICA Osaka, in concert with community groups, organizes a programme of recreational activities and cultural exchange events.**

# Welcome to JICA Osaka

Osaka International Centre of Japan International Cooperation Agency (JICA Osaka) extends a hearty welcome to all JICA participants.

## 1. Location of the centre in the Kansai region

JICA Osaka is located in Ibaraki City, Osaka prefecture, in the heart of the Kansai region. Ibaraki lies close to the ancient cultural centers of Kyoto and Nara, and to the commercial, industrial and economic center of Osaka, and the city of Kobe.

## 2. Orientation Programme & Japanese Language Course

(1) The four days after arrival at JICA Osaka are dedicated to an orientation programme, during which participants are introduced to JICA Osaka and its facilities, attend lectures on Japan's economy, society and culture, and participate in an international exchange programme with local communities.

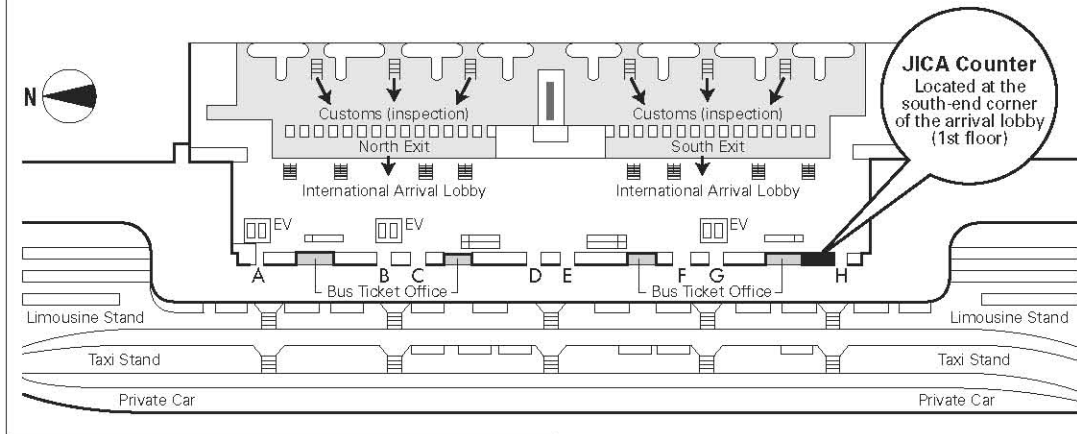
(2) It is desirable that participants acquire basic Japanese daily conversation for use in communication with training institution personnel and in other situations outside the scope of their technical training. JICA Osaka therefore offers:

- 1 an intensive Japanese language course as an integral part of the training programme in designated courses
- 2 an optional Japanese language course held in the evenings

## 3. Weekend Recreational Programme

Occasionally, at the weekends, JICA Osaka, in concert with community groups, organizes a programme of recreational activities and exchange events, including introductions to flower arrangement, tea ceremony, kimono wearing, handicrafts, and folk dancing, and visits to Japanese homes.

## Map of JICA Counter in Kansai International Airport (KIX)



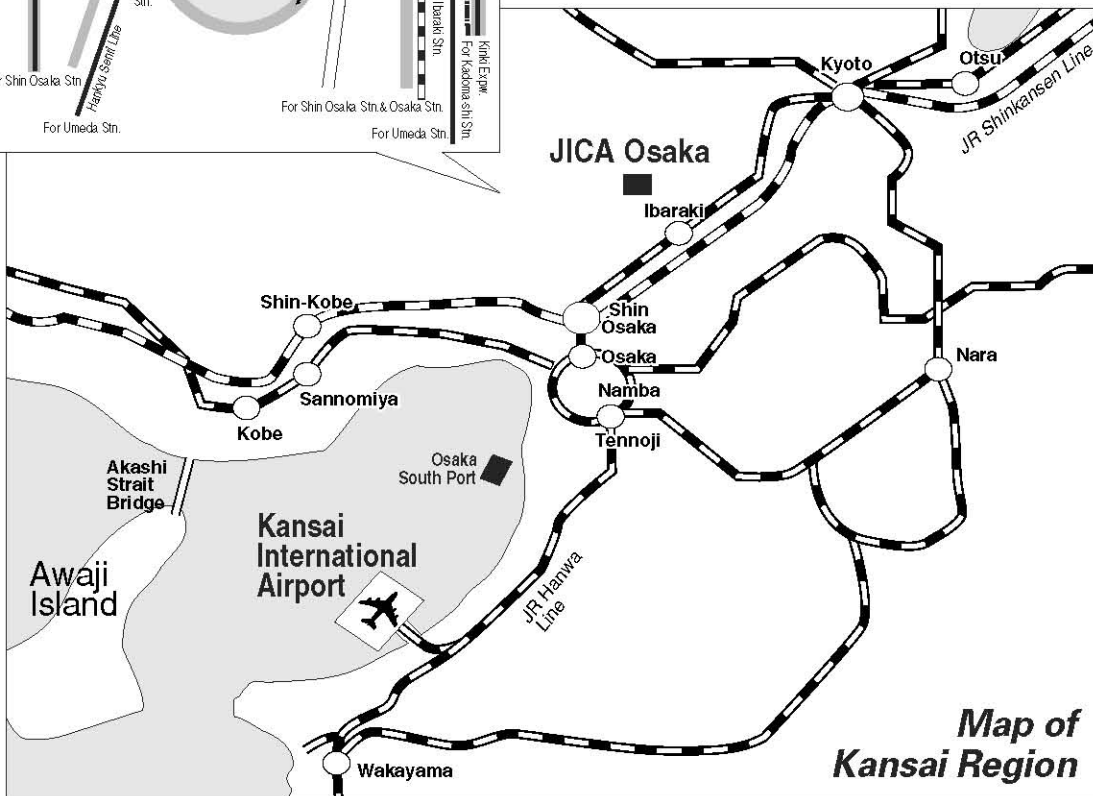
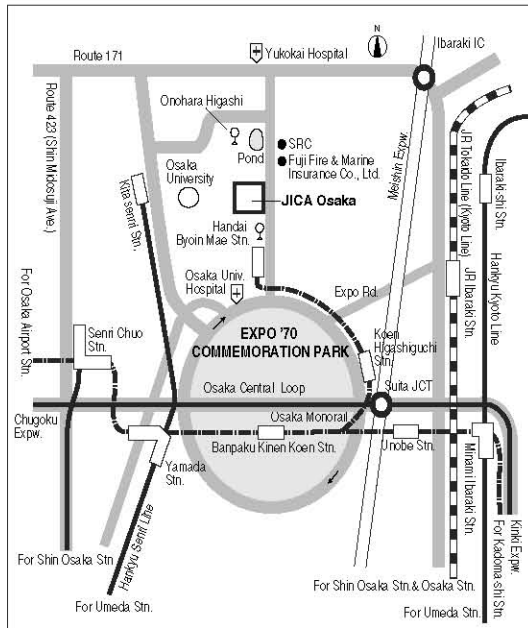
Upon arrival, participants should follow the procedure below:

1. Ride on Wing Shuttle (red elevated tram).
2. Pass through Immigration.
3. Collect baggage and pass through Customs Inspection.
4. Go to the JICA Counter located at the south-end corner of the arrival lobby (1st floor).

The staff at the JICA Counter will provide participants with a limousine bus ticket to Osaka Station (alight at Hotel New Hankyu).

At Osaka Station, a representative of the travel agency designated by JICA will meet the participant. The participant will be taken to JICA Osaka by taxi (with a taxi ticket), which takes approximately 30 minutes.

## Map of the JICA Osaka Vicinity





***CORRESPONDENCE***

For enquiries and further information, please contact the JICA office or the Embassy of Japan. Further, address correspondence to:

**JICA Osaka International Center (JICA OSAKA)**

**Address: 25-1 Nishi-Toyokawa-cho, Ibaraki-shi, Osaka 567-0058, Japan**

**TEL: +81-72-641-6900 FAX: +81-72-641-6910**