

Recycling bamboo biomass and charcoal batteries made from bamboo



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My school



Komatsu Senior High School in Ehime Pref. is located in Southwestern Japan and was established 104 years ago. These photos were taken in April. We have a beautiful Japanese-style garden.

**Subjects taught:
Science and
Information technology**

PHOTO

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LESSON & ACTIVITY

SCIENCE LECTURE



APRSAF-17

**WATER ROCKET EVENT IN
MELBORNE 21.NOV.2010**



Introduction

- In Japan, not using discarded bamboo cuttings effectively as resource is a problem. Leaving bamboo forest become rough in several years and bamboo shoot will not grow in Spring.
- I want to introduce an experiment that creates energy from waste.
- Using the bamboo paper and bamboo charcoal, we can make bamboo charcoal batteries.

Bamboo presents 1



Bamboo presents



Taketori Monogatari (The Heian era)



An old man went to a bamboo forest and found a tiny girl in the bamboo. He then brought her home and raised her for 20 years. In the end, she returned to the moon without saying good-bye.

Preparation materials



(1) Wet bamboo paper-making

NaCl(aq) in a paper cup



Set bamboo paper



bamboo

paper- making

Attention!

Waiting for 2
minutes.

Using saturated
 $\text{NaCl}(\text{aq})$.

Using kitchen paper
instead of -bamboo
paper-.



(2) Rolling with bamboo charcoal

Before



After



(3) Rolling with aluminum foil

Before



After



(4) Lighting test

Before

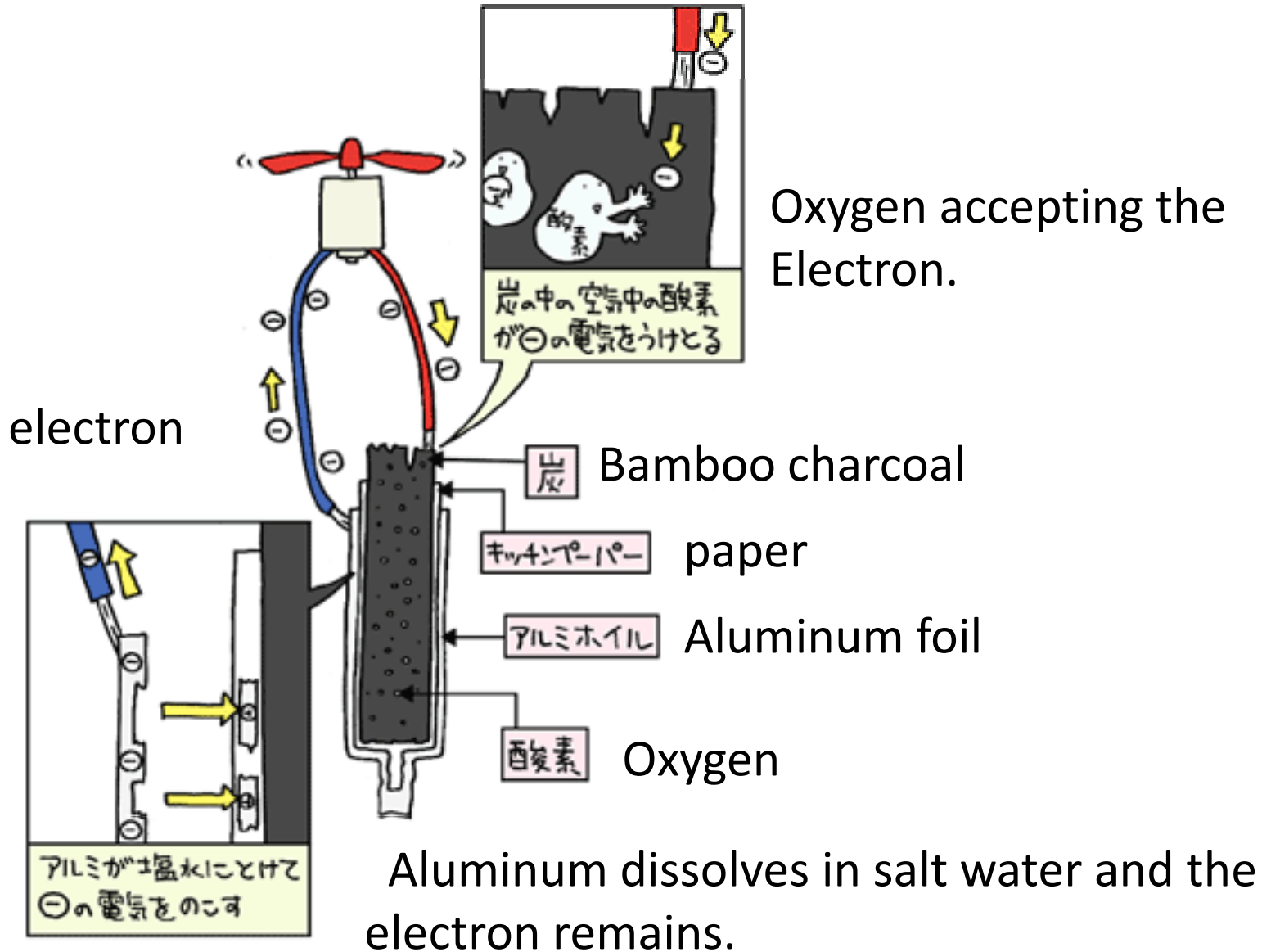


After



(-)Al | NaCl(aq) | O₂ (+)
Black Red

Charcoal battery system

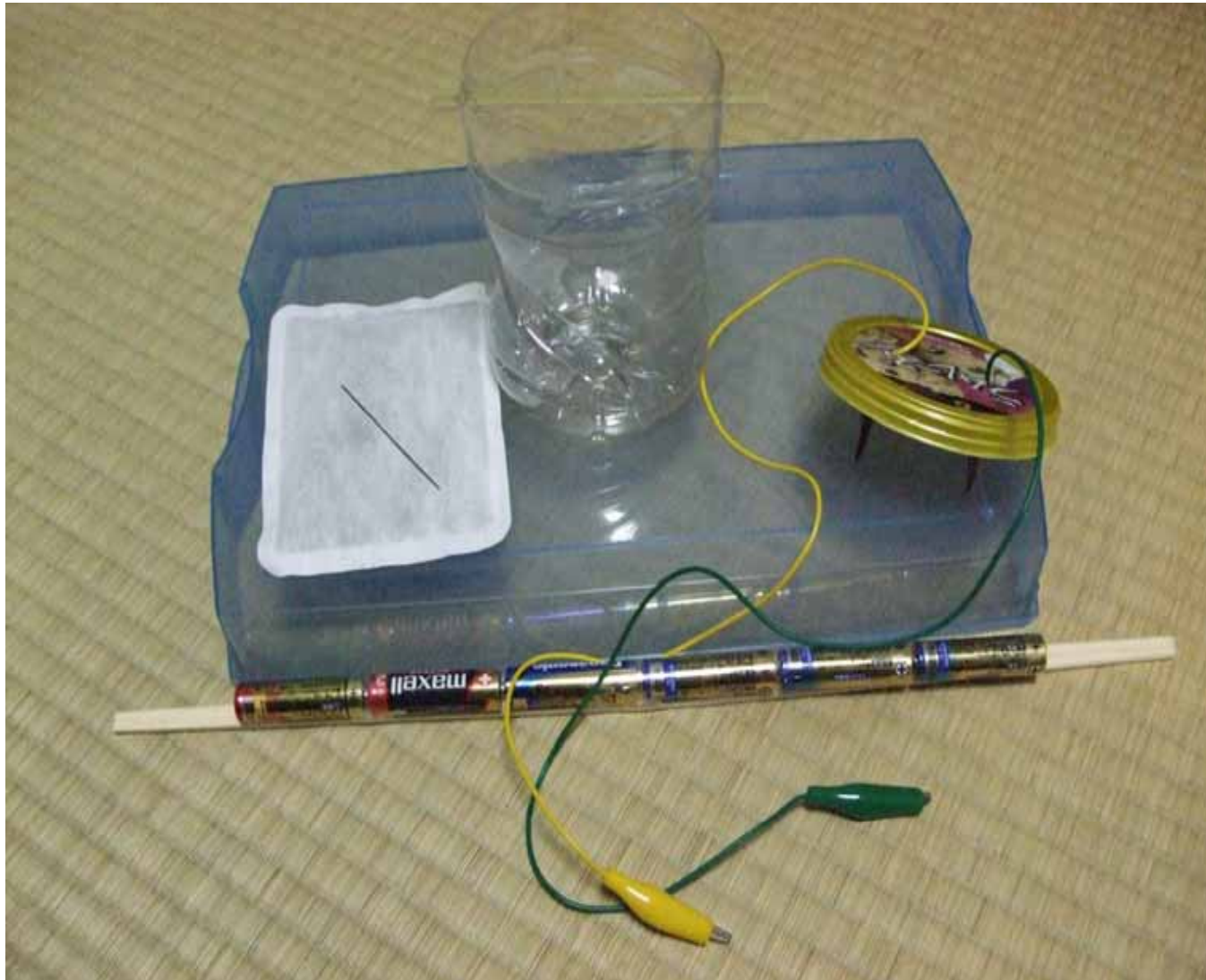


Edison's relation to Japan

Edison developed a lamp in 1880. —
He used bamboo from Kyoto in Japan.



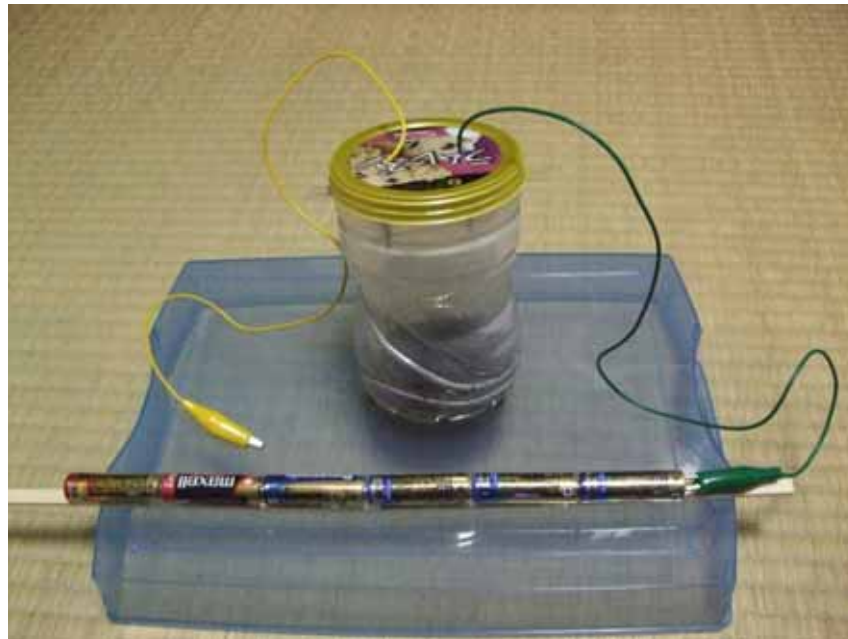
Edison's lamp



We can buy an Edison lamp kit in Japan for ¥10,000, but it's expensive, so we often make it using discarded plastic pet bottles etc.

Edison's lamp

Before



After



Black material is the heating pad for removing oxygen. This experiment uses a 9V cell battery.

Papermaking



Pulping the bamboo



Before

After

Bamboo pulp

The bamboo is boiled in the aqueous sodium hydroxide. Then the bamboo is removed.

That work was finished at my school on a cold day in January in Japan.

Posutarukun set

Check Posutarukun



Other preparation



(1) Setting case and cutting pulp

Setting case



Cutting pulp



(2) Making pulping liquid

Before



After



(3) Adding the pulping liquid

Setting



Adding the pulping liquid



(4) Homogenizing

Homogenize using finger



Wait for a few minutes



(5) Dehydrating

Use the plastic net



Remove the frame



(6) Drying

Dehydrate with clothes



Dry paper (Work)



Houston in a Japanese atlas



Kennedy Space Center in Japanese geography B text with photo

ケネディ宇宙センターを訪ねる

フロリダ州のオーランドから車で1時間ほど走ると、ケネディ宇宙センターに着いた。ここにはスペースシャトルの発射台があるほか、これまで打ち上げてきたロケットや宇宙飛行士のスーツなど、宇宙開発にかかわるさまざまなものが展示されている。3時間ほどのバスツアーを通して、地球を飛び出して宇宙にまでおよぶアメリカ合衆国のフロンティアスピリットをかいま見ることができた。



▲④ ケネディ宇宙センター(フロリダ州 2005年撮影)

大自然とめぐり会う

アメリカ合衆国西部には、グランドキャニオン国立公園がある。乾燥した大地が深く刻み、断崖が果てしなく続く。長400km以上、幅は広いところで30kmい。歩いて谷をおりて行くと、かつてインディアンとよばれたネイティブアメ



Epilogues

- It is important in a spaceship to make new materials using waste.
- In space, as well as on Earth , experiments that create energy from discarded bamboo are very attractive.
- Thank you everyone for participating in the experiment until the end.

Final Presentation,

Nice to meet you, everyone. My name is Yoshiteru Fujie.

I teach at Komatsu Senior High School in Ehime Pref. in southwestern Japan.

Now, I hope that you have a good time and learning about space education. Please don't touch the experimental tools. OK? Here we go.

1) Recycling bamboo biomass and charcoal batteries made from bamboo

2) Komatsu Senior High School in Ehime Pref. is located in southwestern Japan, and was established 104 years ago. These photos were taken in April. We have a beautiful Japanese-style garden.

3) I teach science and information technology.
In this photo, I'm making soap from waste oil.

4) Lesson & Activity

The left photo of SCIENCE LECTURE; the right one is of the APRSAF-17 WATER ROCKET EVENT IN MELBOURNE 21.NOV.2010.

5) Introduction

In Japan, not using discarded bamboo cuttings effectively as resource is a problem. Leaving bamboo forest become rough in several years and bamboo shoot will not grow in Spring. I want to introduce an experiment that creates energy from waste.

Using the bamboo paper and bamboo charcoal, we can make bamboo charcoal batteries.

6) Bamboo presents

Look at this picture. You may find many types of bamboo gifts that I have bought at Takeya Dogo Spa and made .

7) In this cute photo, you can see an owl and a duck. We often associate pretty owls with happiness in Japan. Can you guess why ? I'll give you a hint from the previous photo. Not being able to see the photo, I can only guess what is intended here. However, this last part has me confused.

8) Next, do you know the classic Japanese story "Taketori Monogatari" from the Heian era? The story goes like this;

An old man went to a bamboo forest and found a tiny girl in the bamboo. He then brought her home and raised her for 20 years. In the end, she returned to the moon without saying good-bye.

9) Preparation materials

Look at this picture, while I explain today's experiment.

I will show you how to discover a lamp made of bamboo, like Edison.

10) First, you make wet bamboo paper with saturated NaCl(aq). Prepare the cup and NaCl(aq). Pour about 20 ml of NaCl(aq) in a cup and place the bamboo paper in it.

11) If you don't have bamboo paper, don't worry. You can make it another way. using suggestion :a paper towel. Try it yourself and wait for 2 minutes.

12) Second, rolling with bamboo charcoal
After 2 minutes, you will find wet paper. Put the wet paper on the tray and roll it with the bamboo charcoal.

13) Third, rolling with aluminum foil
Roll it with aluminum foil like this.

14) Fourth, the lighting test
Check the red and black codes; red is the cathode and black is the anode. Aluminum is the anode, bamboo charcoal is the cathode.

15) Charcoal battery system
Aluminum dissolves in salt water and only the electron is left. Then, oxygen accepts the electron. The electron moves the circuits, lighting the lamp.

16) Do you know Edison's relation to Japan ?
Edison developed a lamp in 1880. Edison's lamp has deep relation to Japan. He used bamboo from Kyoto in Japan. This photo is of a monument of Edison.

17) Edison's lamp
We can buy an Edison lamp kit in Japan for ¥10,000, but it's expensive, so we often make it with discarded plastic pet bottles etc.

18) Edison's lamp
The black material is a heating pad for removing oxygen. This experiment uses a 9V cell battery. Wait for 10 minutes for removal of the oxygen.

19) Papermaking
Look at this picture. We call this WASHI in Japanese. On the left is a leaf of bamboo paper, next it is bleached, third is the skin of bamboo shoot, and on the right is bamboo paper.

20) Pulping the bamboo
The bamboo is boiled in aqueous sodium hydroxide. Then the bamboo fiber is removed. That work was finished at my school on a cold day in January in Japan.

21) Postarukun set

Now, we will try papermaking. I brought a kit for you called Postarukun. Check the pieces and get ready.

22) Setting the case and cutting the pulp

First, you set the case as shown in the left photo, and cut the pulp little by little.

23) Making the pulping liquid

Second, you put the pieces of pulp into the pet bottle one by one, and shake the bottle well. Two or three minutes later, observe the pulping liquid. If you don't find the pulping liquid, you must shake the bottle for 3 minutes more.

24) Adding the pulping liquid

In the previous section, we got the pulping liquid; Third, set the case as shown in the photo and you add the pulping liquid to the case.

25) Homogenizing

Homogenize using your finger, then wait for a few minutes.

26) Dehydrating

Use the plastic net for dehydrating, and take the wet paper out of the frame.

27) Drying

Use clothes to dry. If you want to dry paper quickly, use heating metal. The photo on the right shows this.

28) Houston in a Japanese atlas

Now, are you interested in Japanese textbooks and what is written in them? Let me show you. Please look at this picture. Houston is introduced as an IC town in the USA. Find the blue IC symbol.

29) Kennedy Space Center in a Japanese geography B text with photo

This photo is of Kennedy Space Center. The explanation is written in Japanese.

30) Epilogues

It is important in a spaceship to make a new materials using waste. In space, as well as on Earth, experiments that create energy from discarded bamboo are very attractive.

I feel that this session was too short to explain all the mysteries of bamboo, but thank you everyone for participating in the experiment until the end.