

# Study on Reaction Conditions for Making Transparent Wood

W202102-2

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## ① Introduction

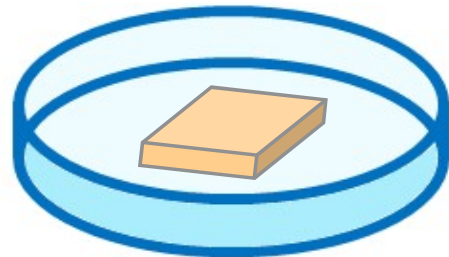
Transparent wood ... alternative material to plastic

- not made from petroleum
- light and durable
- low thermal conductivity

## ② Method

Basic experiment

1. Soak wood in **NaOH**aq
2. Apply UV
3. Soak wood in **H<sub>2</sub>O<sub>2</sub>**aq
4. Wash the wood with ethanol and toluene



## ③ Hypothesis

Change the concentration of **H<sub>2</sub>O<sub>2</sub>**aq and **NaOH**aq

→ Transparent wood can be made efficiently

## ④-1 Materials for Experiment 1

<Experiment 1: H<sub>2</sub>O<sub>2</sub>aq (0%, 30%)>

NaOHaq(10%)

<Materials(thickness)>

Balsa wood (1,2,3mm), Cypress wood(1,2,3mm),

Cherry wood (5mm), Zelkova wood (5mm)

## ⑤-1 Results of Experiment 1

	Balsa (1mm)	Balsa (2mm)	Balsa (3mm)	Cypress (1mm)	Cypress (2mm)	Cypress (3mm)	Cherry (5mm)	Zelkova (5mm)
0%H <sub>2</sub> O <sub>2</sub>	×	×	×	○	×	×	×	×
30%H <sub>2</sub> O <sub>2</sub>	◎	△	×	×	×	×	×	△

◎: You can read the words on the newspaper underneath.

○: You can see the words but can't read.

△: Decolorized

×: No change



Left: Balsa 1mm processed by 0%  $\text{H}_2\text{O}_2\text{aq}$

Right: Balsa 1mm processed by 30%  $\text{H}_2\text{O}_2\text{aq}$



Left: cypress 1mm processed by 0%  $\text{H}_2\text{O}_2\text{aq}$

Right: cypress 1mm processed by 30%  $\text{H}_2\text{O}_2\text{aq}$

## ⑥-1 Conclusion of Experiment 1

<Experiment 1>

- Thickness 1mm is suitable

→ If it is more than 1 mm, the chemicals will not soak

- The suitable  $\text{H}_2\text{O}_2$  concentration is 30%

→  $\text{H}_2\text{O}_2$  has a bleaching effect

## ④-2 Materials for Experiment 2

<Experiment 2:  $\text{NaOH}_{\text{aq}}$  (10%, 20%, 30%)>  
 $\text{H}_2\text{O}_{2\text{aq}}$ (30%)

<Materials (thickness) >

Balsa wood (1mm), Cypress wood (1mm)

Japanese cedar wood (1mm),

Japanese zelkova wood (1mm)

## ⑤-2 Results of Experiment 2

	Balsa (1mm)	Cypress (1mm)	Japanese cedar(1mm)	Zelkova (1mm)
<b>10% NaOHaq</b>	△	×	◎	◎
<b>20% NaOHaq</b>	△	×	◎	◎
<b>30% NaOHaq</b>	△	×	◎	◎

◎: You can read the words on the newspaper underneath.

○: You can see the words but can't read.

△: Decolorized

×: No change



Left: zelcova 1mm not processed

Right: zelcova 1mm processed by 30% NaOHaq

## ⑥-2 Conclusion of Experiment 2

<Experiment 2>

- We could not find any changes in the results due to the difference in NaOH concentration

## Future Tasks

- Research the differences due to soaking time  
(Conditions fixed at 30% H<sub>2</sub>O<sub>2</sub>aq, 10% NaOHaq)
- Make the 1mm wood size wider
- Infiltrate powdered wood into resin

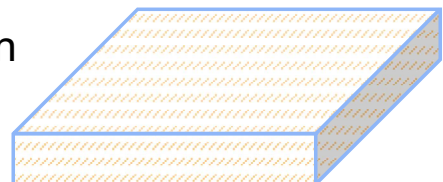


Image: Transparent wood into resin

## References

QINQIN XIA et al (2021). Solar-assisted fabrication of large-scale, patternable transparent wood. *Science Advances*, 2021 Vo17, Issue 5.

**Thank you for listening !!**