

# Structured water and its effect on the cell proliferation rate

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Varna, Bulgaria

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- 1. Introduction on the Energy source**
- 2. Properties of the Energy**
- 3. Effect on the cell Proliferation rate**

# Raw material

Typical feldspar family  
of clay minerals



Osaekhyulto  
(Five colored Stone)

Melting Point. 1117.3 °C

composition	percentage (%)
SiO <sub>2</sub>	56.9
Al <sub>2</sub> O <sub>3</sub>	17.4
Fe <sub>2</sub> O <sub>3</sub>	9.49
CaO	0.53
MgO	2.48
K <sub>2</sub> O	3.06
Na <sub>2</sub> O	0.98
MnO	0.087
TiO <sub>2</sub>	0.76
P <sub>2</sub> O <sub>5</sub>	0.067
Ignition loss	8.246
Total	100

## Manufacturing process

1. Exploitation of special mineral known as “five colored stone”
2. Grinding down to 320 mesh powder with ball mill
3. Heat treatment at 800 °C for 1 hour
4. Fermentation at room temperature for more than 30 days after mixing with water.
5. Drying at temperature higher than 200 °C → Product; **Ceramic powder**\* combined with Qelby\*
6. Separation of Qelby in gel state → Product; **Gel** state material.

\*Qelby®; Quantum Energy Living Bdy

# Outline of manufacturing process



오색혈토를 800℃-850℃ 고온에서 가열하여 세라믹을 변화시키는 공정



분쇄공정



캘비숙성공정



캘비분리공정  
캘비 천연젤 추출공정



1000℃ 고온에서 10시간 가열 후에도 살아 있는 광물계 소마티드 캘비가 확인 됨



광석에서 분리된 천연 캘비젤



캘비가 빛, 수분, 공간에너지와 반응하여 환원성 복사 에너지를 방산

Final products,  
Powder and Balls



## Registered in ICID

ICID (International Cosmetic Ingredient Dictionary),  
Published by PCPC (Personal Care Products Council,  
originally CTFA, Cosmetics Toiletries and Fragrance Association)

Registered as “Quantum Energy® Radiation Powder”

Other ID	Type	Prop	Other names
N99011	T	No	Quantum Energy Radiation Material Powder
Supp ID	Abbr	Mono ID	INCI Name
S9493	Quantum Energy	21300	Clay

Function; Anti aging, Hair conditioning, Skin conditioning,  
Other skin conditioning, UV cut, Anti pimple formation, etc.

# US FDA registered class 1 medical device

2014. 1.

Item;  
Bed, Quilt, Clothes, Guard,  
Ceramic ball, Socks, Necklace,  
Bracelet, Powder

2014. 11.

OTC drug ; Immunity  
improvement, Health food  
(Healing food)  
Feed additive, Fertilizer additive

2014. 12.

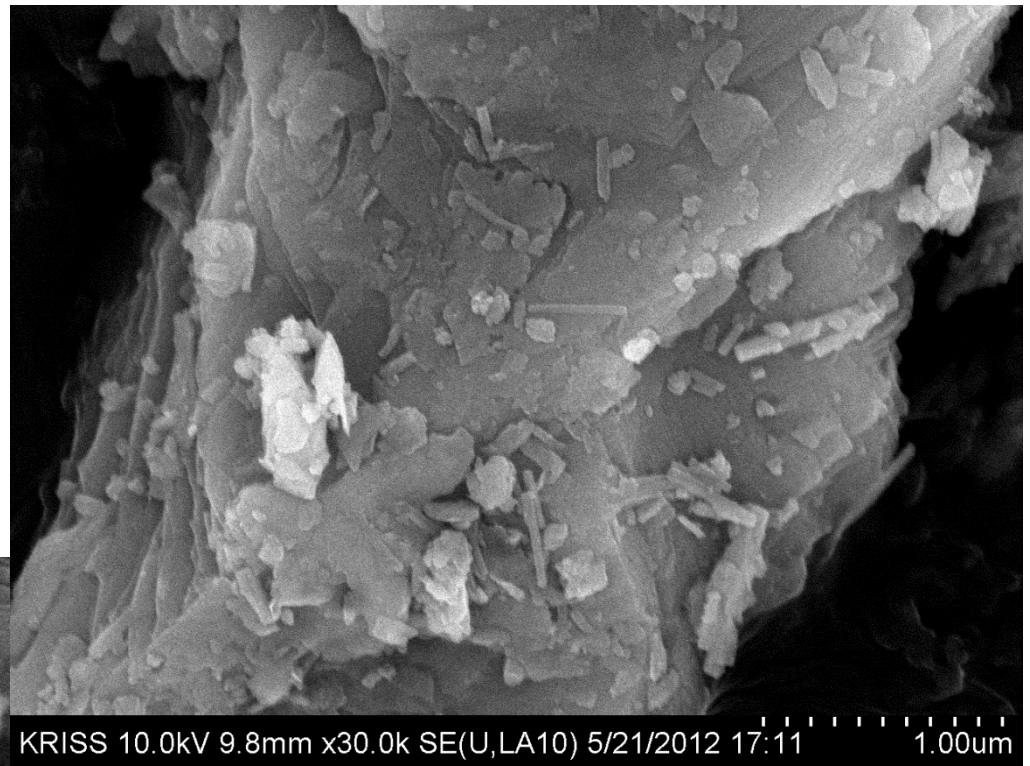
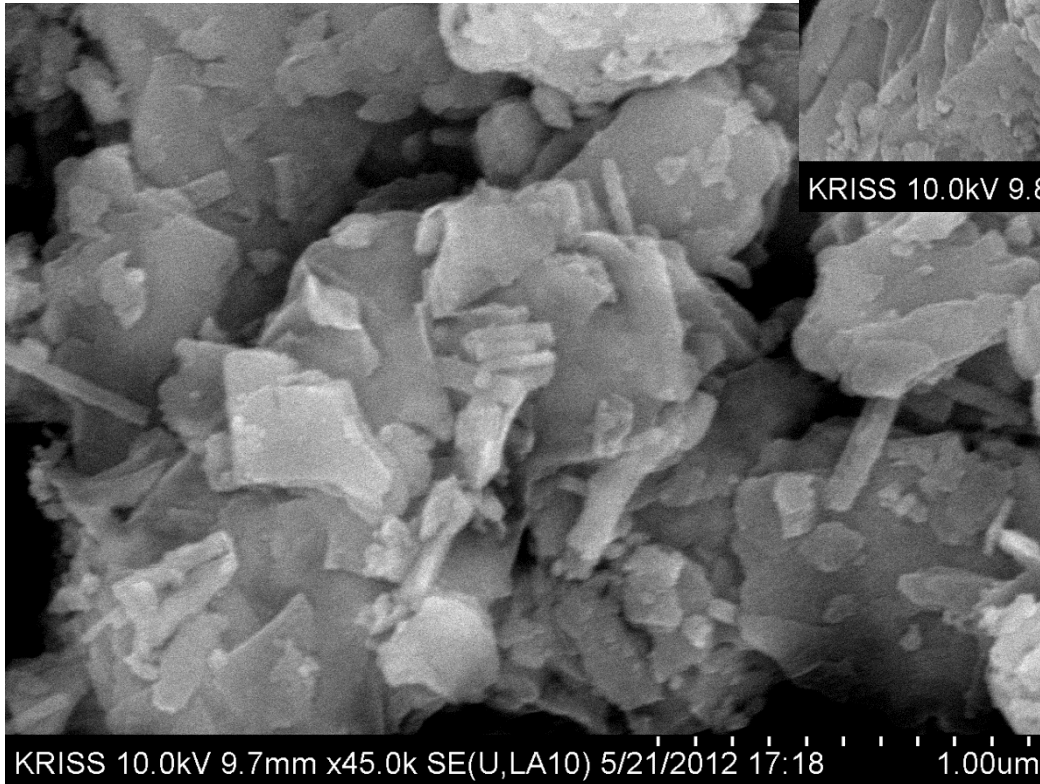
Ceramic ball safety, Drinking water



Quantum Energy Powder for  
Feed additives and Fertilizer  
additives.

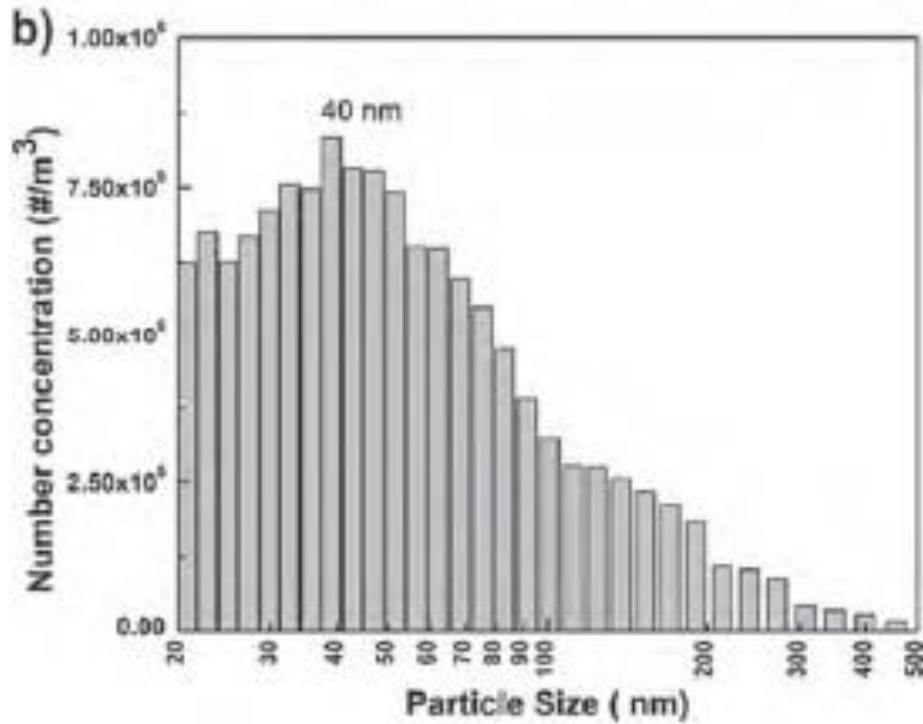
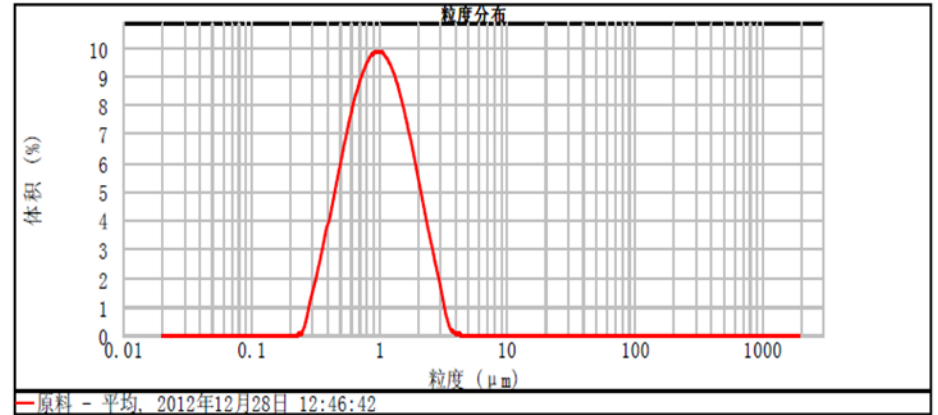
# SEM

Processed powder

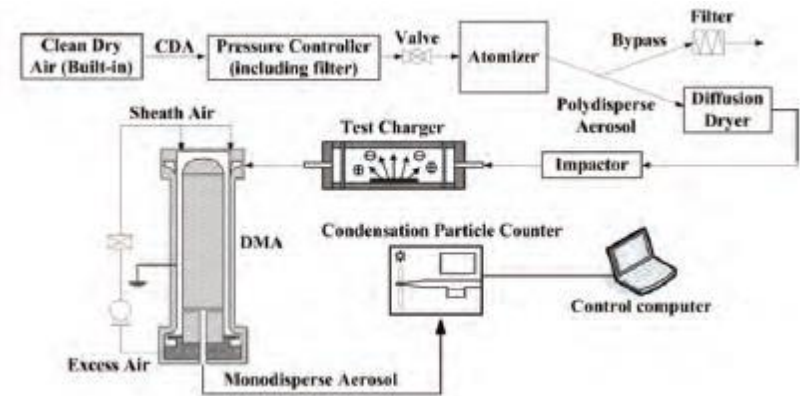




# Particle Size Analysis



## Aerosol based technology



# Zeta potential

## Measurement condition

- (1) Solvent : H<sub>2</sub>O
- (2) Temperature : 25 °C
- (3) Refractive Index : 1.332 8
- (4) Viscosity : 0.887 8 cp
- (5) Dielectric constant : 78.3

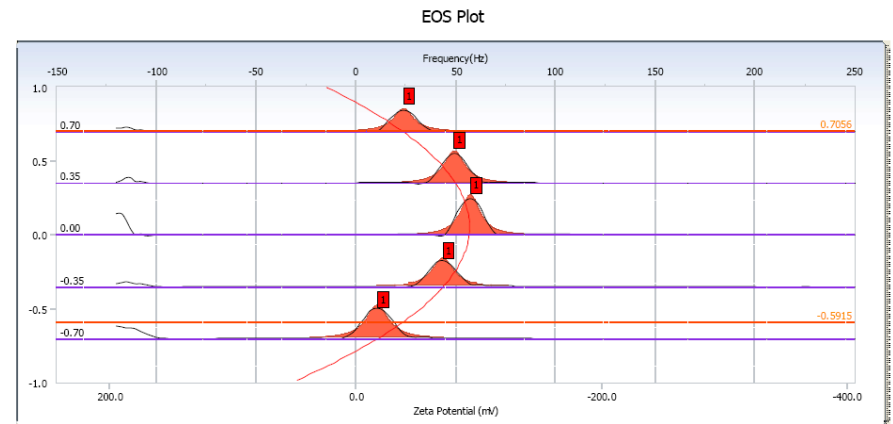
**-37.74 mV → hydrophilic**



ELSZ  
Common

3D Plot		S/N :	
User	: Common	Group	: 한국고분자
Date	: 2013-02-26	File Name	: 1320198-1
Time	: 11:10:19	Sample Information	:
SOP Name	: 한국고분자	Repetition	: 1/3
		Security	: No Security

Version 3.73 / 2.30



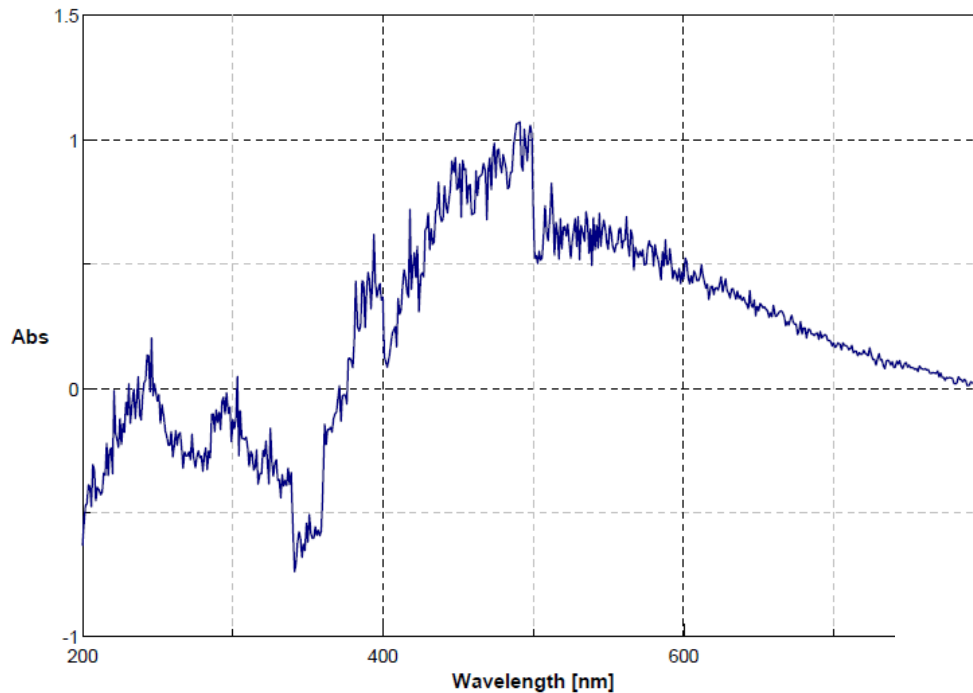
Measurement Results			
Zeta Potential	: -37.74	(mV)	Doppler shift : 23.25 (Hz)
Mobility	: -2.943e-004	(cm <sup>2</sup> /Vs)	Base Frequency : 120.0 (Hz)
Conductivity	: 0.0113	(mS/cm)	Conversion Equation : Smoluchowski
Zeta Potential of Cell		Diluent Properties	
Upper Surface	: -61.24 (mV)	Diluent Name	: WATER
Lower Surface	: -91.06 (mV)	Temperature	: 25.0 (°C)
Cell Condition		Refractive Index	: 1.3328
Cell Type	: Flow Cell	Viscosity	: 0.8878 (cP)
Avg. Electric Field	: -16.35 (V/cm)	Dielectric Constant	: 78.3
Avg. Current	: -0.01 (mA)		

# **Energy Transmitting Property**

- Absorbs UV, radiates IR –**

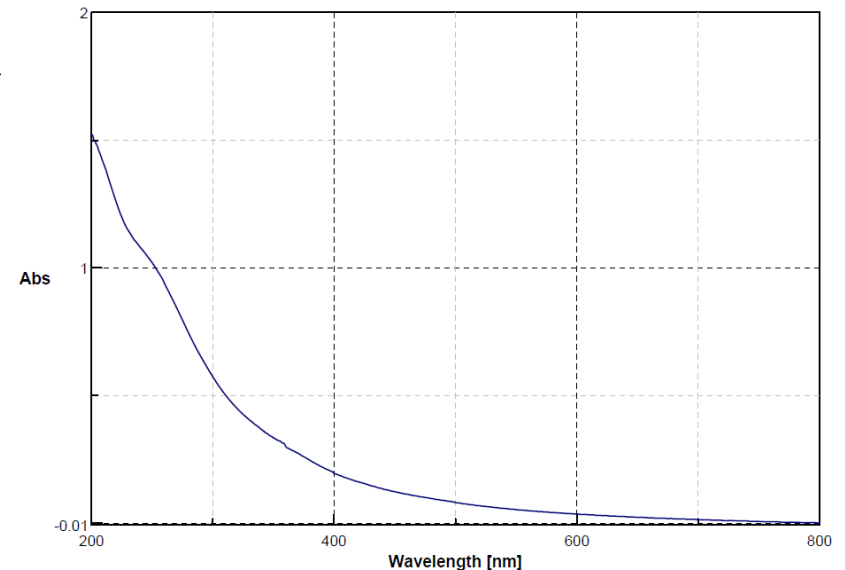


# UV-Vis spectroscopy of water mixed with Qelby powder.

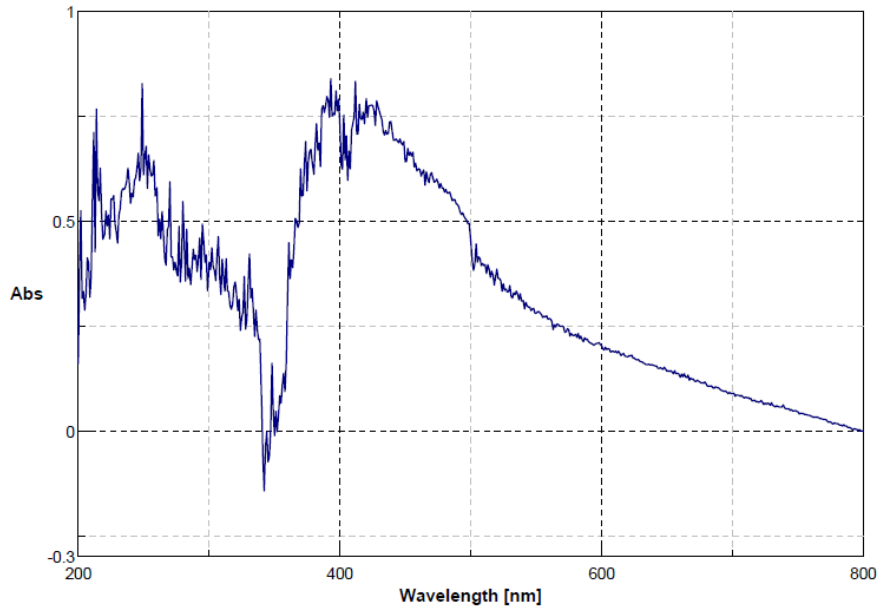


Absorbs light for the range of 400 nm ~ 600 nm wavelength.  
1 w/o of powder,  
agitated for 2 hours,  
measured as is.

Centrifuged for 30 minutes at 3,000 rpm.  
Supernatant was used for measurement.  
Transmission mode.

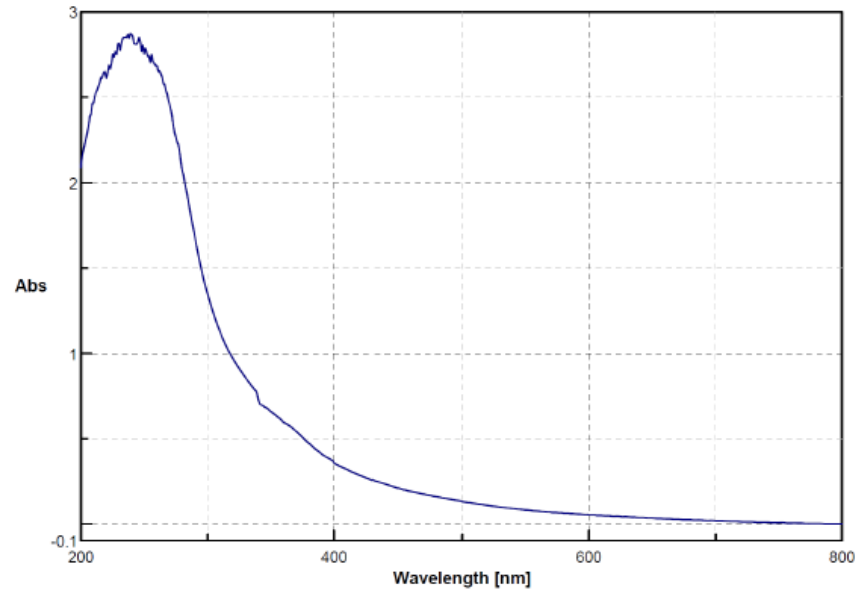


# UV-Vis spectroscopy of water mixed with gel



Qelby gel, 1 % in DW,  
agitated for 2 hours,  
Measured as is.

Centrifuged for 30 minutes  
at 3,000 rpm.  
Supernatant was used for  
measurement.

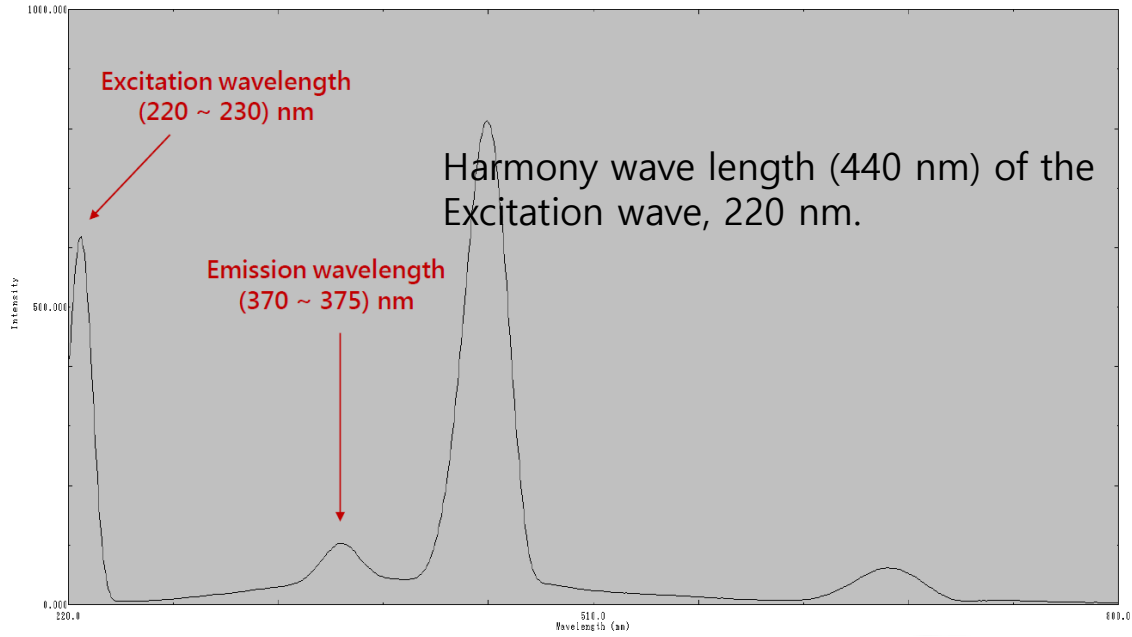


# Fluorescence Spectrum Analysis

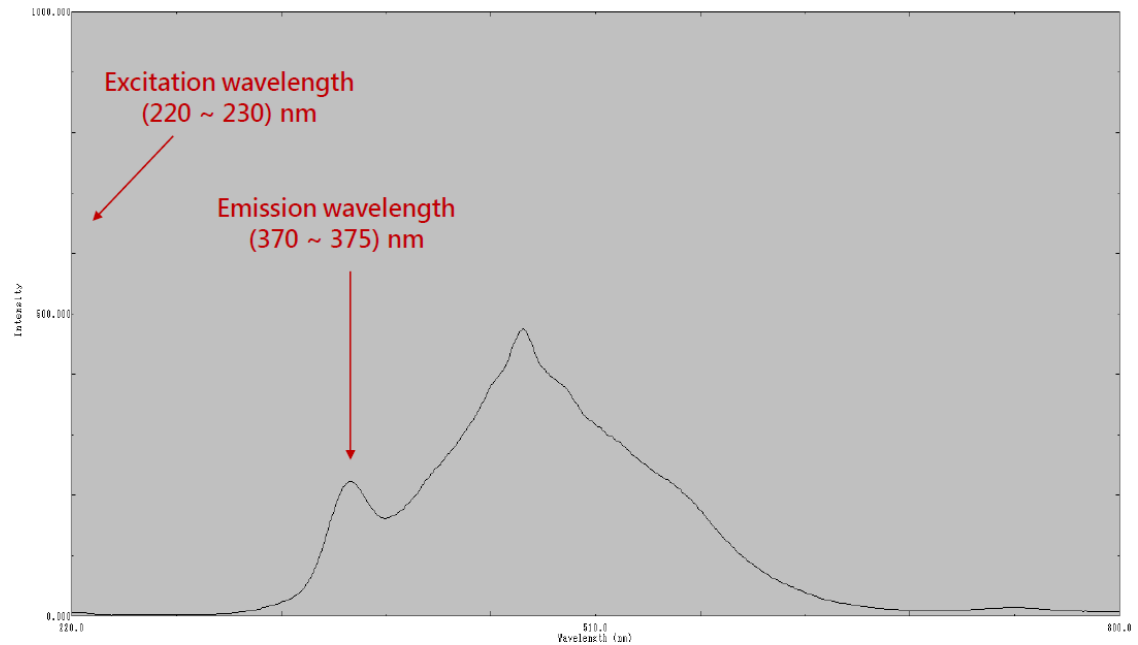
## Measurement condition

Measurement method	Fluorescence spectrum scan
Excitation wavelength	220 nm
Emission wavelength range	(220 ~ 800) nm
Slit width	Ex(15 nm), Em(10 nm)
Light source	150 W Xenon lamp
Detector	Photomultiplier

# A; Coarse powder



# B; Fine powder

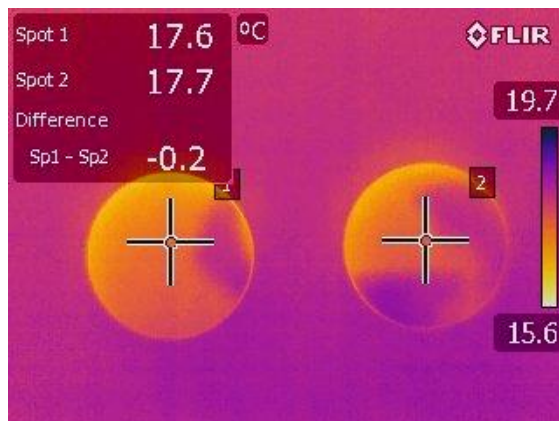
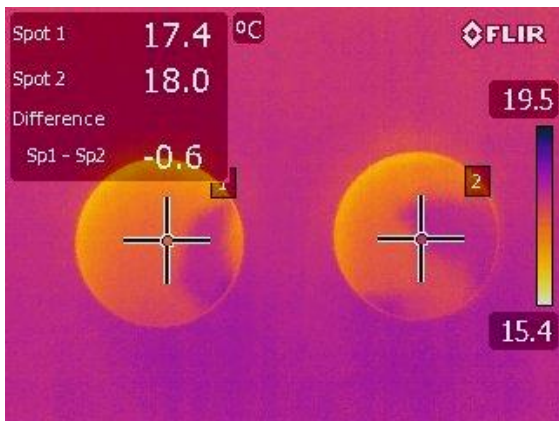


# Infrared radiation; Thermal image analysis

		1st	2nd	3rd	Ave.	
1 <sup>st</sup> measurement	Silica	23.1 °C	23.2 °C		23.05 °C	
	Qelby	23.9 °C	23.4 °C		23.65 °C	
	<b>ΔT</b>	<b>+0.8 °C</b>	<b>+0.2 °C</b>		<b>+0.6 °C</b>	
2 <sup>nd</sup> measurement	Silica	17.8 °C	17.6 °C	17.7 °C	17.7 °C	Simultaneous measurement
	Qelby	17.8 °C	17.7 °C	17.8 °C	17.8 °C	
	<b>ΔT</b>	<b>+0.2 °C</b>	<b>+0.2 °C</b>	<b>+0.2 °C</b>	<b>+0.2 °C</b>	
3 <sup>rd</sup> measurement	Silica	17.4 °C	17.6 °C	17.3 °C	17.4 °C	Simultaneous measurement
	Qelby	18.0 °C	17.7 °C	17.6 °C	17.8 °C	
	<b>ΔT</b>	<b>+0.6 °C</b>	<b>+0.2 °C</b>	<b>+0.3 °C</b>	<b>+0.4 °C</b>	

$\Delta T = \text{Qelby} - \text{Silica}$       It shows higher temperature than silica.

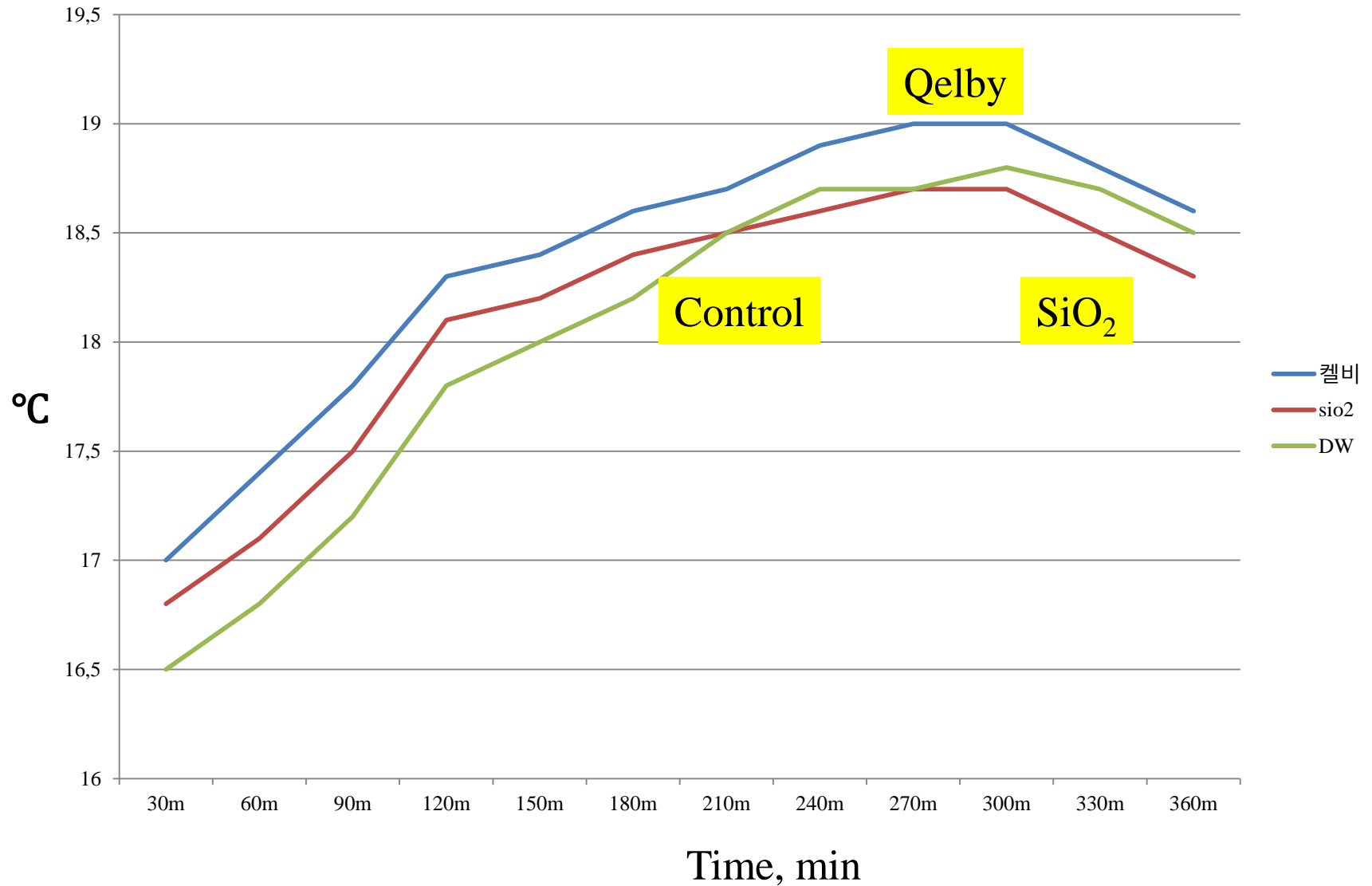




3<sup>rd</sup> measurement ; 2014. 12. 16.

Infrared wave range ; 7.5  $\mu\text{m}$  ~ 13  $\mu\text{m}$

# Temperature measurement in non-contact manner



- 1. Introduction on the Energy source**
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# **Anti Oxidation**

## **- Anti aging -**



# Oxidation of iron (nail)

4 days later

Qelby + Salt water



SiO<sub>2</sub> + Salt water



Salt water



Brown color indicates iron oxide

# Oxidation of Iron



# Anti oxidative effect of Qelby powder

Bean sprouts were adopted for anti oxidation test.

140 hours later



Qelby



SiO<sub>2</sub>



DW

**Discoloration of sprouts in SiO<sub>2</sub> and Distilled Water.  
→ Faster oxidation compare to the sprouts in  
Quantum energy powder.**

# 140 hours later, stems of bean sprout



**DW**

**Qelby-Lower**

**Qelby-Upper**

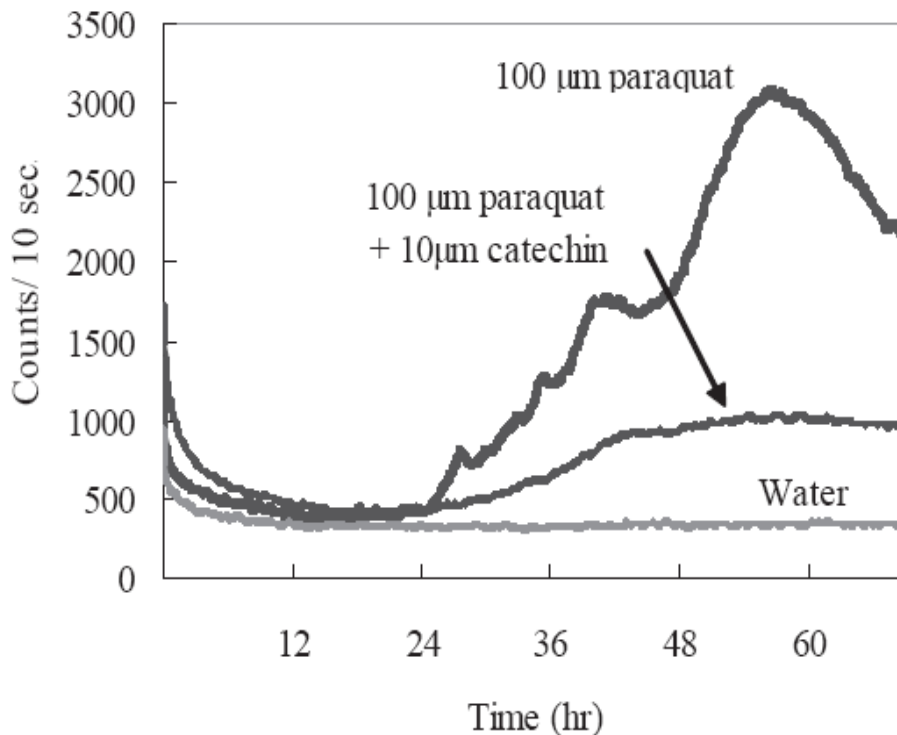
**SiO<sub>2</sub>**



# Bio photon

## Bio photon emission

- From the oxidation reaction.
- Bio photon emission increases with oxidative cell reaction.



## Journal of Biomedical Optics

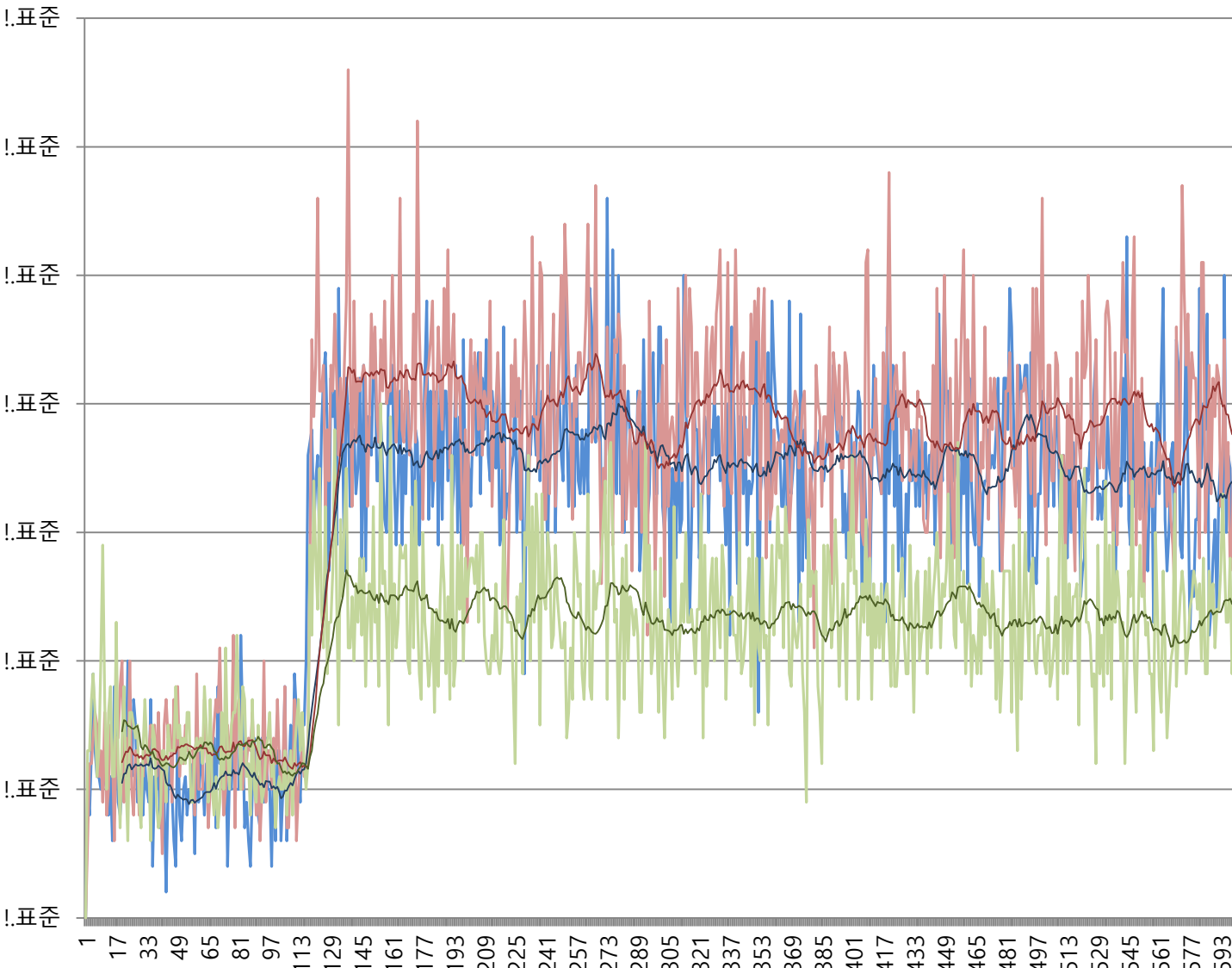
SPIEDigitalLibrary.org/jbo

**Spontaneous ultraweak photon emission  
imaging of oxidative metabolic processes  
in human skin: effect of molecular oxygen  
and antioxidant defense system**

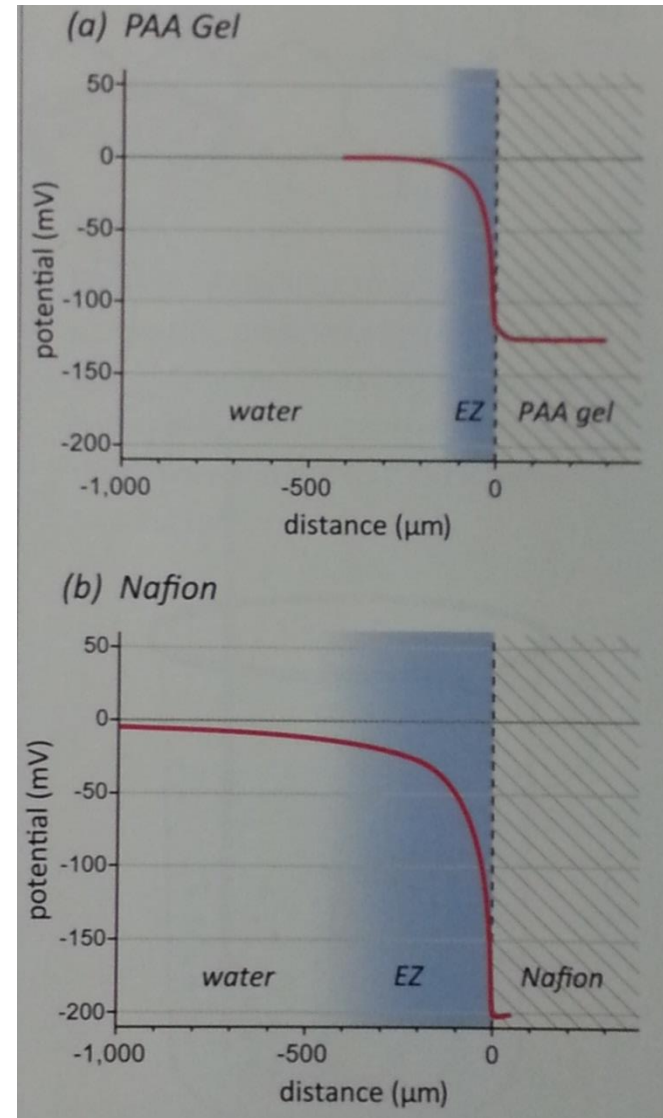
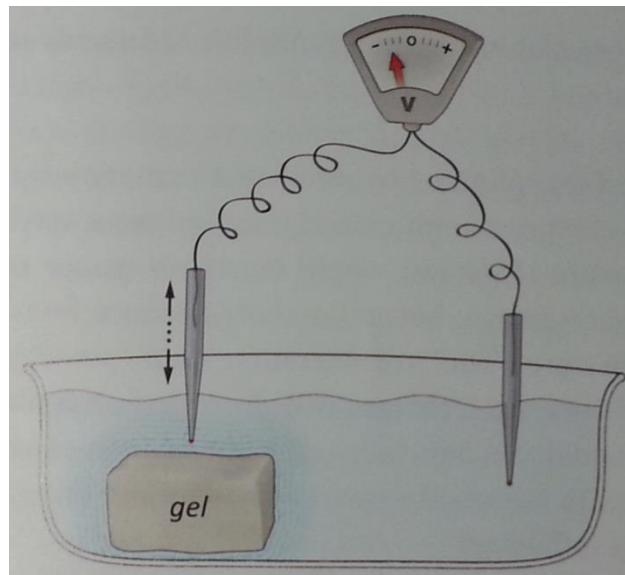
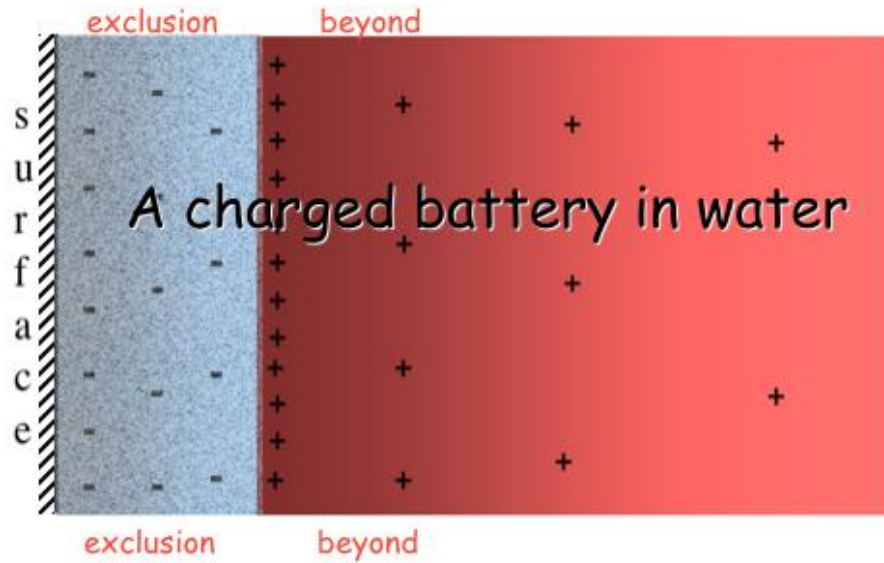
If paraquat (strong oxidant) is mixed with catechin (antioxidant), the bio photon emission decreases.

Photo Multiplier Tube

# 7 days later



# Anti oxidation Property of Structured Water



Source; "The Fourth Phase of Water", Pollack, p.53

# Charge generation from the Structured Water

Water 500 g, Ceramic ball 200 g

Nafion film,  
NR-211, 25.4  $\mu\text{m}$   
Hole diameter, 5 cm

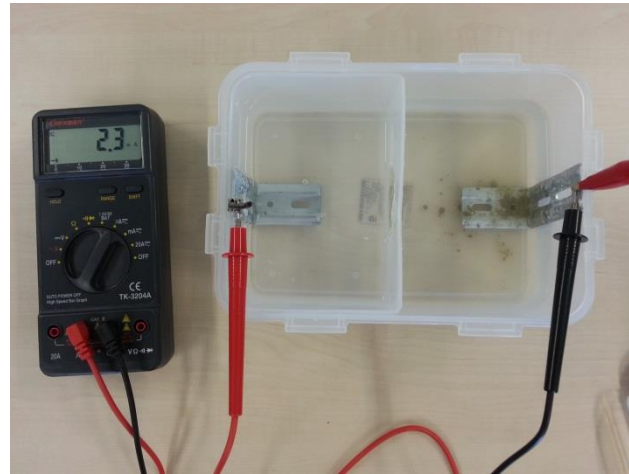


-17.2 mV

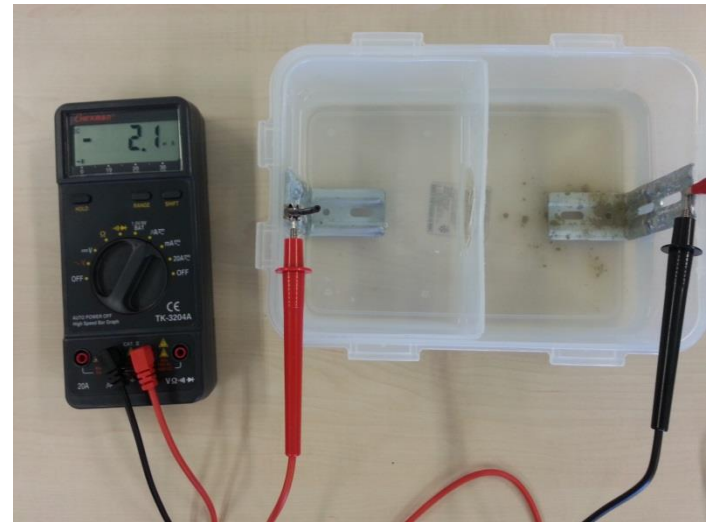
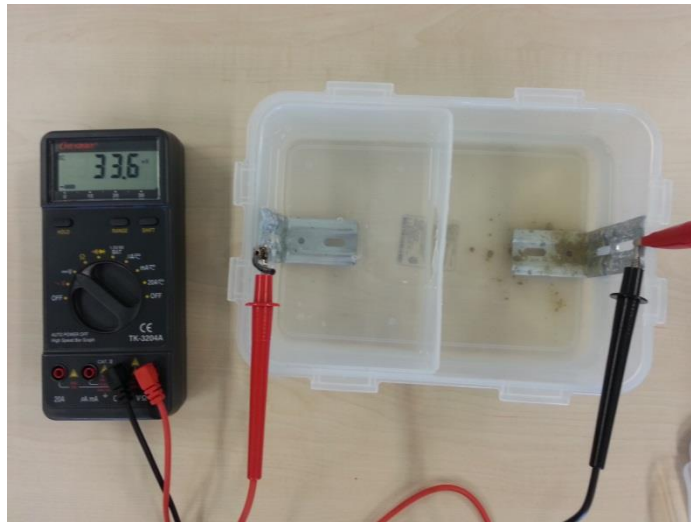


-2.9  $\mu\text{A}$

Ceramic ball side is cathode. Negative charges are generated.



Polarity reversed measurement shows that powder mixed side is (-), cathode.



Concentration; 1 % of powder. Tap Water 500 g.

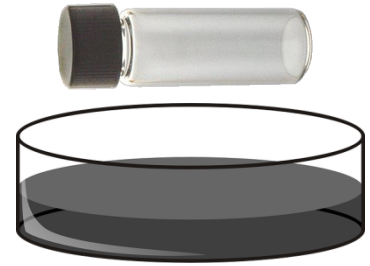
# Reductive Radiation Energy X from Qelby

Effect on Water in non-contact manner

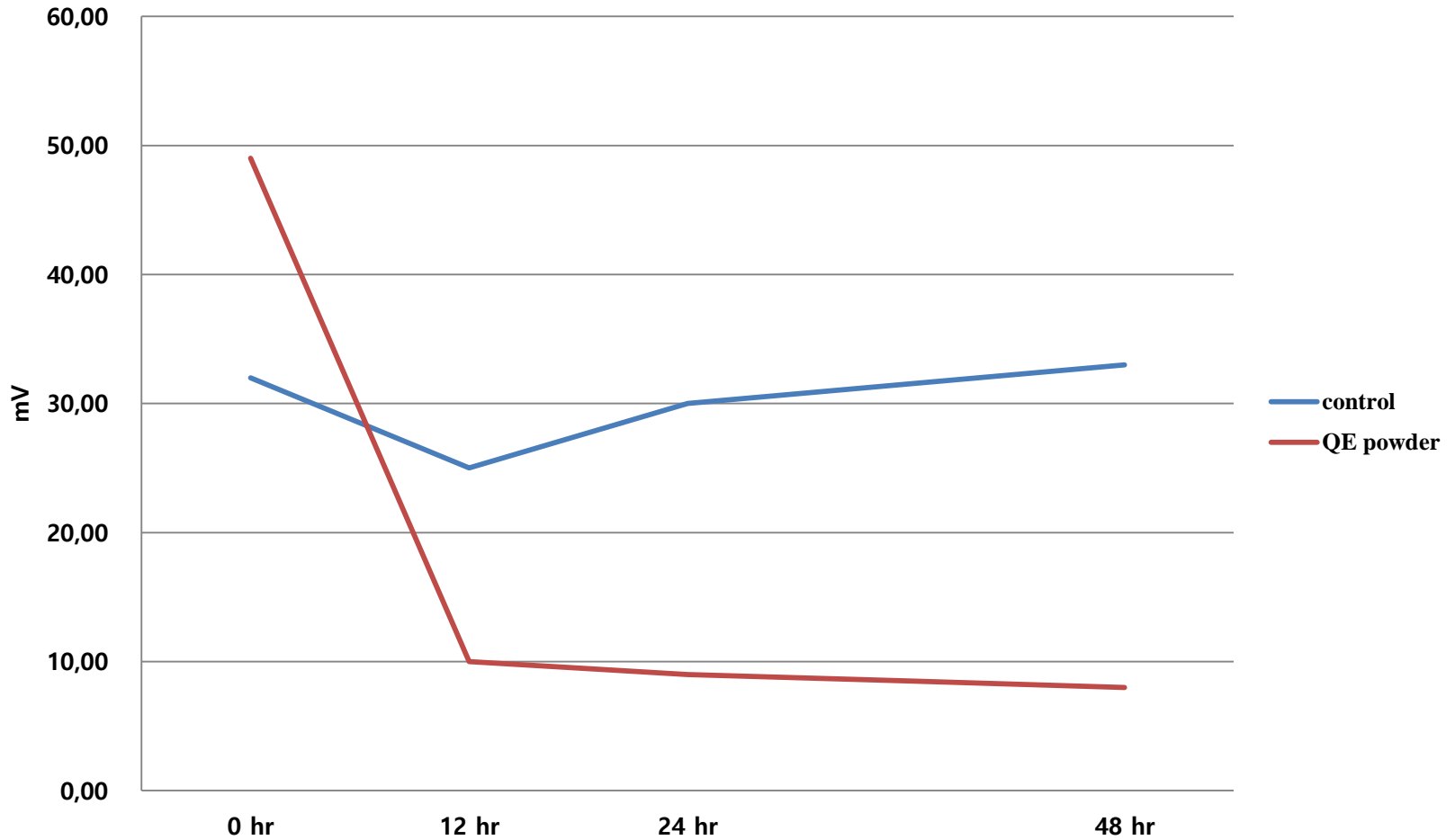


# ORP measurement

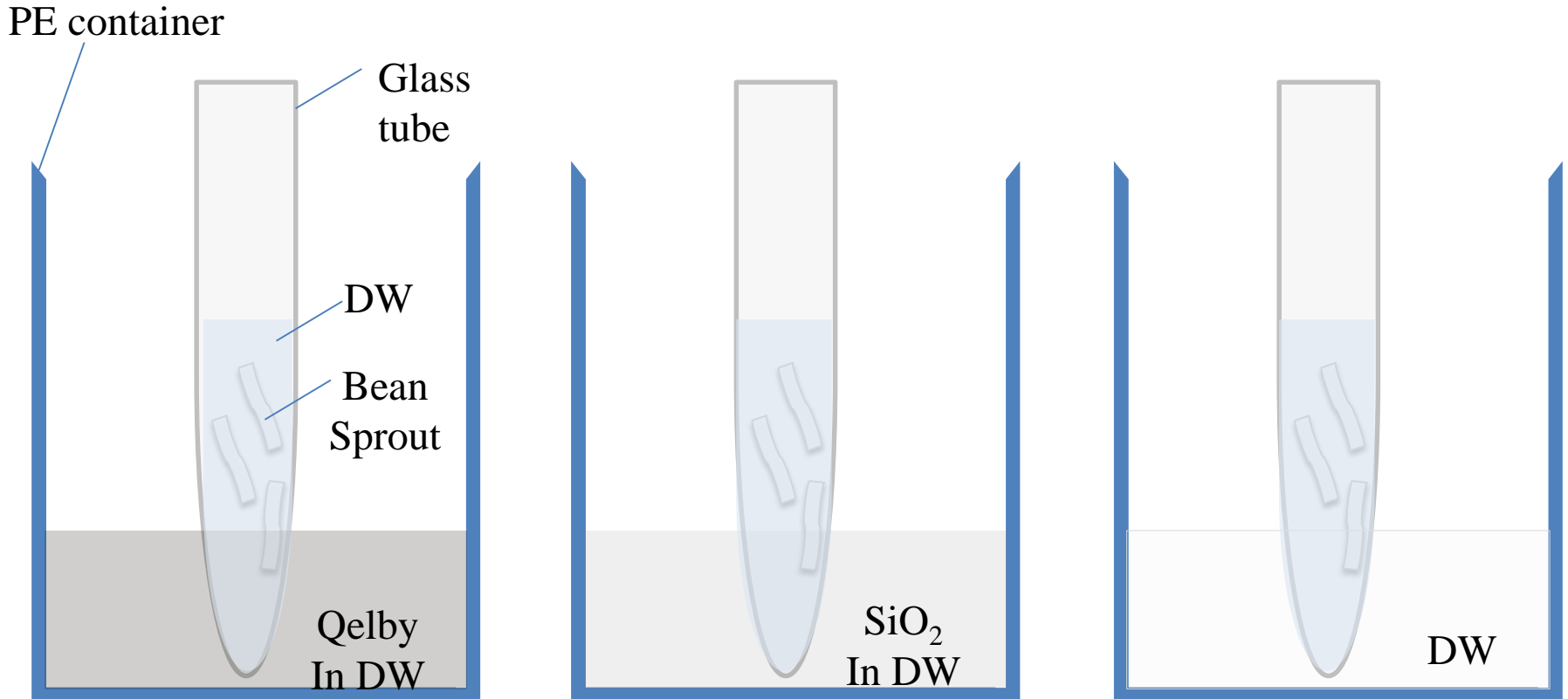
Water in a beaker is placed above the quantum energy powder.



## ORP of water



# Effect of Qelby on organic materials in non-contact manner





**Results;  
After six days.**



**Qelby**

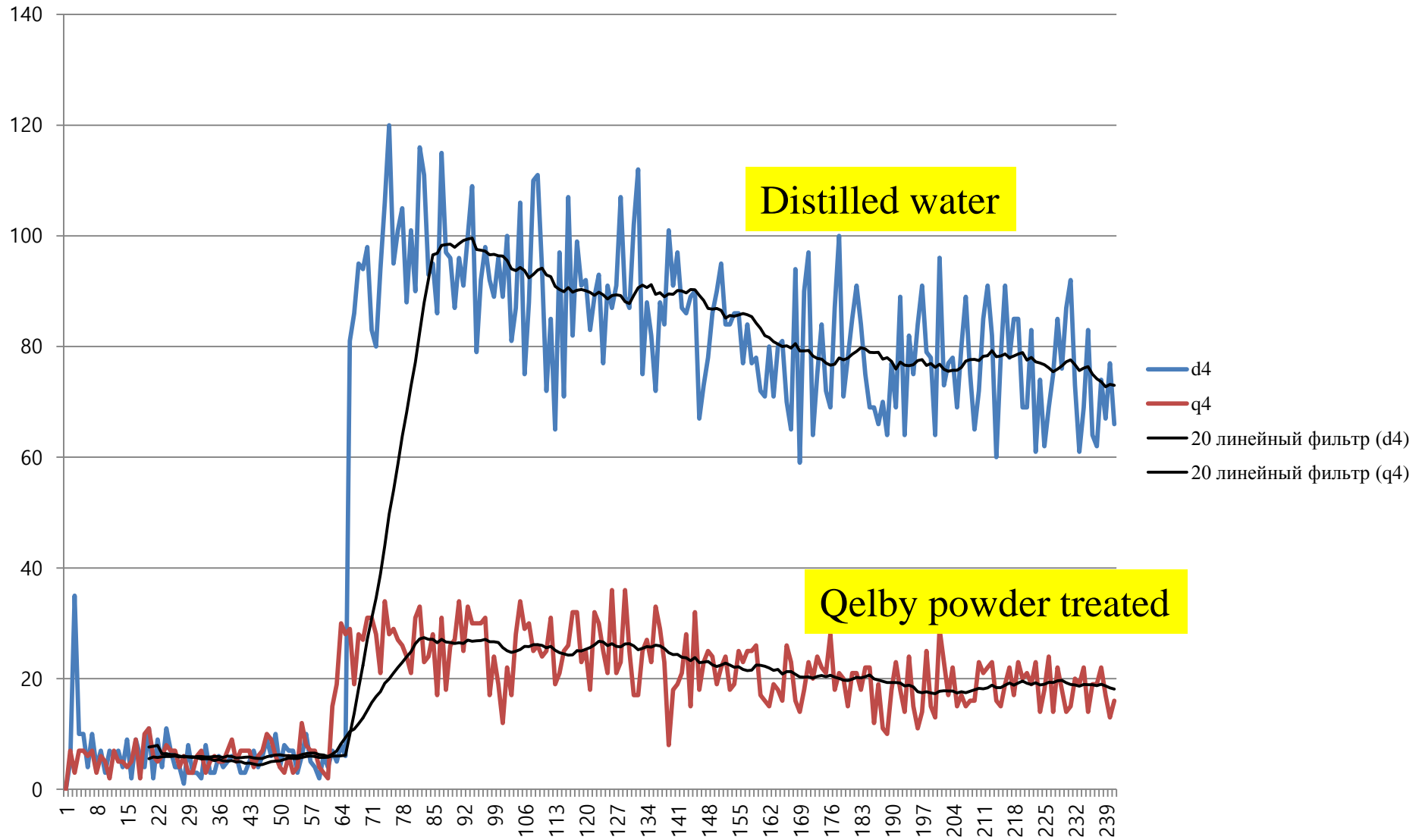


**SiO<sub>2</sub>**



**DW**

# Results after 93 hours.



# Physical Property

Item	Control (distilled water)	Treated for 48 hours	Test method
Boiling point, °C	0	0	OECD TG 103
Freezing point, °C	0	0	OECD TG 102
Density at 25 °C, kg/m <sup>3</sup>	922.4	923.4	ASTM D792
Specific heat at 25 °C, J/g•°C	4.255	4.289	KS M 3049
Surface tension, dyne/cm	58.32	60.46	Ring method
Electric conductivity, μS	0.7	0.6	

200 ml of distilled water in a vial was placed above a petri dish containing 30 g of powder.

No difference in viscosity for non-contact treatment. However, it was increased from 0.91 cP to 0.94 cP for water mixed with the powder, 1 w/o .

## Dielectric constant, $\epsilon'$

Distilled water at 10 kHz, room temperature ( $23\text{ }^\circ\text{C} \pm 2\text{ }^\circ\text{C}$ ).

Treatment	$\epsilon'$
0	81.1
10 days	84.2
17 days	87.3

Dielectric constant of pure water at  $25\text{ }^\circ\text{C}$  is 78.30 according to the NIST data.

$$C = \frac{Q}{V} = \epsilon \frac{A}{t}$$

A: 전극의 면적 t: 전극 간 간격

$\epsilon$ : 전극 간 물질의 유전상수

Increase of Dielectric constant means,

→ Increase of charge capacity

→ Due to the separation of  $\text{H}^+$  ion and  $\text{e}^-$  electron

# Ice structure

Observed with cryo-SEM

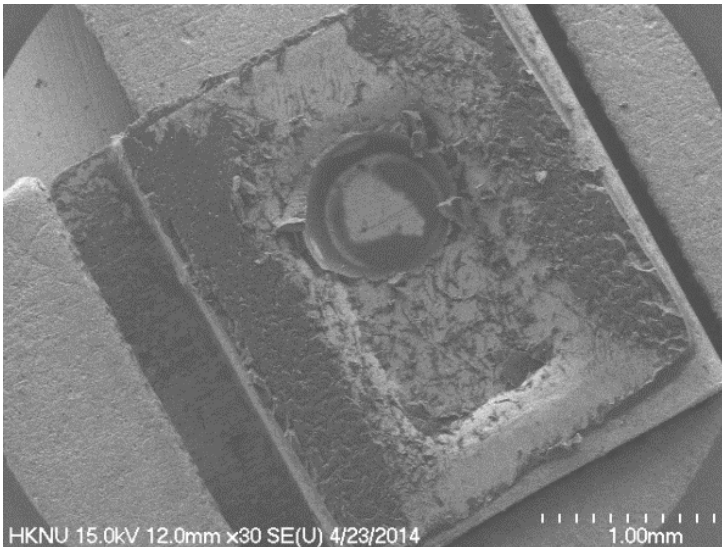


## Cryo-FE SEM

4.5 mm x 3 mm Copper carrier, add small amount of water.  
Jet freezing device → Quick freeze

Attach copper carrier to loading box cooled to  $-196\text{ }^{\circ}\text{C}$

### High Vacuum Cryo Transfer System

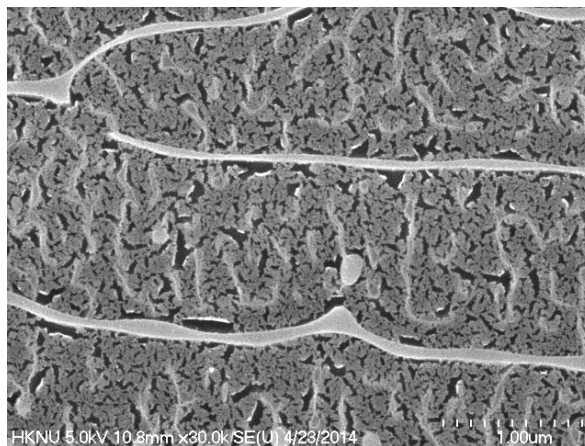
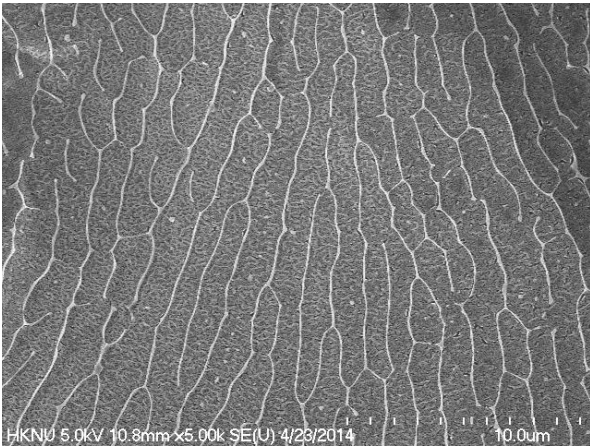
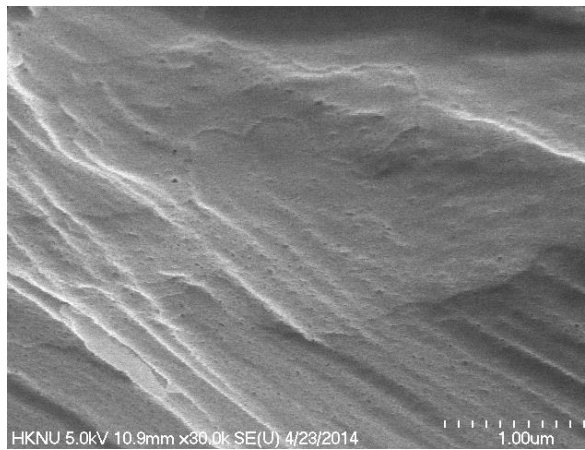
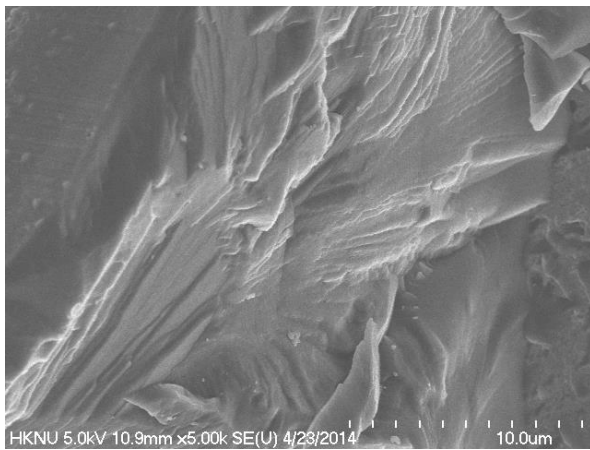


Freeze-Fracture/Etching/Coating  
in one unit.

Etching  $-110\text{ }^{\circ}\text{C}$ , 1 min.  
Coating 30 mA, 100 s (Pt)

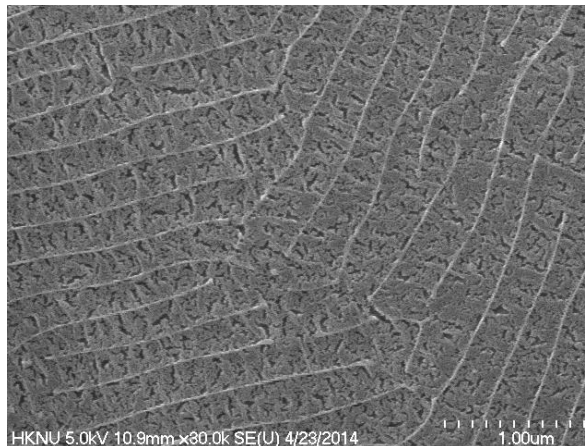
Observation at  $-120\text{ }^{\circ}\text{C}$

Distilled water



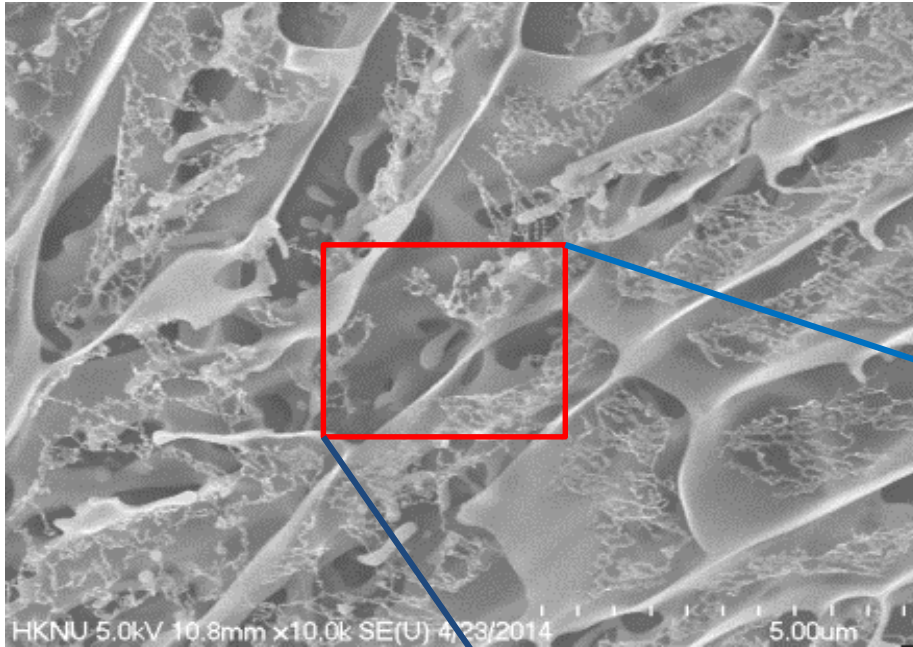
DW + Quantum powder  
Non-contact, 51 hours.

High density boundary layer, from the fourth phase of water?



DW+Quantum powder  
Mixed, 51 hours,  
supernatant.

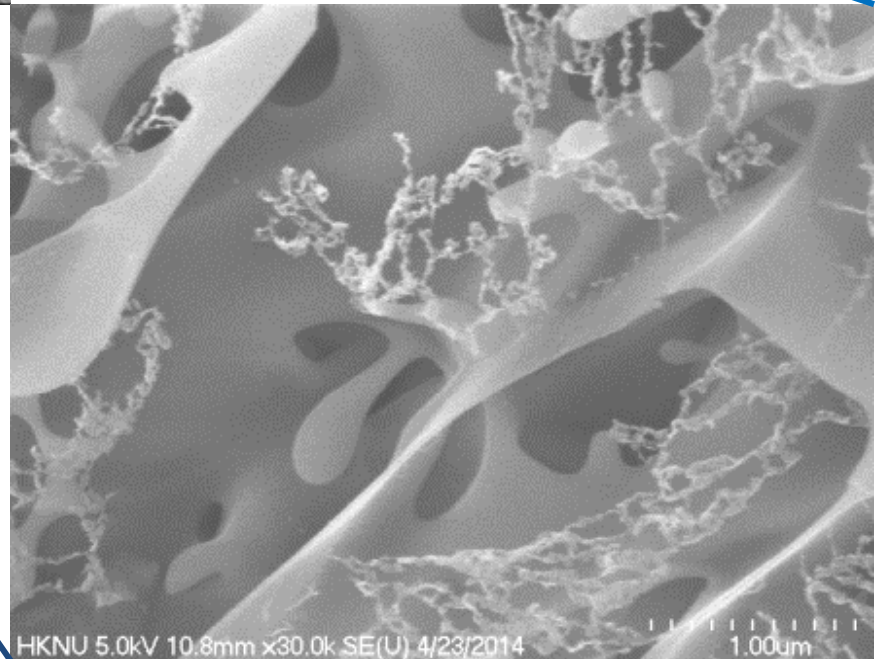
Smaller domain size  
Fractal shape?



Magnification, 10,000 X

3 dimensional view of ice from structured water

Sponge like morphology  
Structured water forming the wall



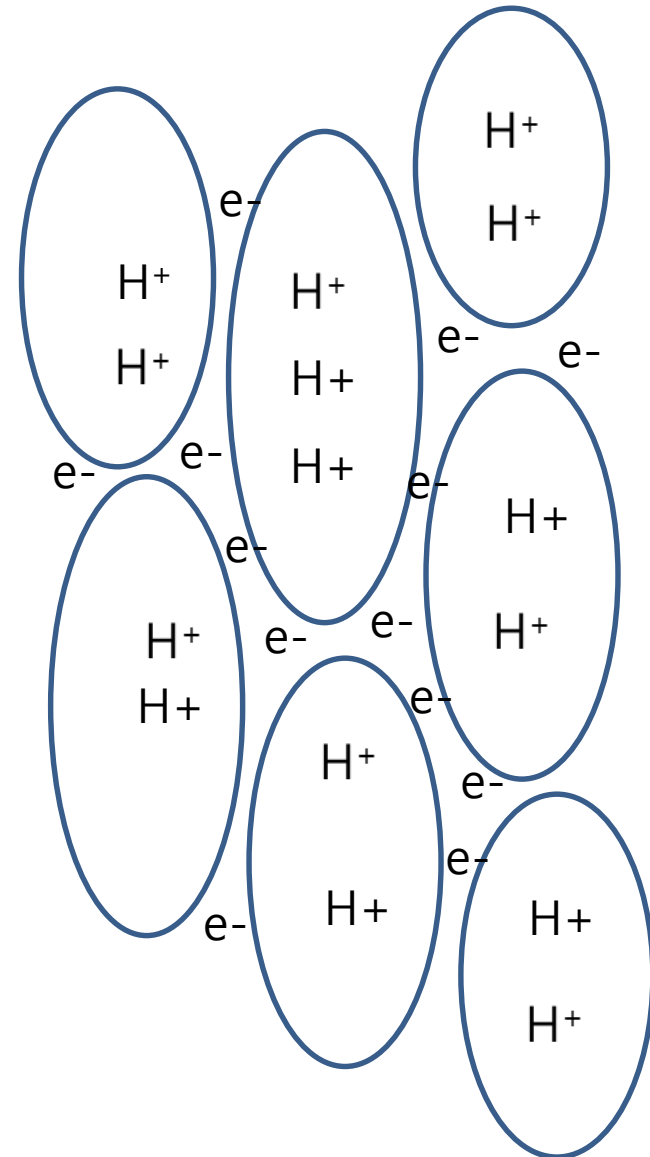


# A new proposal on the water structure

**Three dimensional Mosaic fractal structure of water**

**→ PBL model of water structure**

**Structured water → H<sup>+</sup> ion located inside of each cell structure, electrons are concentrated on the dense wall structure where water is structured.**



## Gas Exclusion from the water



As the water is structured, dissolved gases are expelled out as the particles are excluded out from the EZ water.

## Frozen structured water

Gas molecules are expelled out.



- 1. Introduction on the Energy source**
- 2. Properties of the Energy**
- 3. Effect on the cell Proliferation rate**

# **Effect of Structured water on the cell proliferation rate**



# Direct treatment



Qelby powder

10 ml of DMEM +  
0.1 g of Qelby powder

Kept in a refrigerator at 4 °C for 2 days.

The suspended layer was used for preparation.

Seeded in a 96 well plate at a density of  $1 \times 10^4$  cells/well. Allowed to adhere for 3 hours.

Treated with LPS  $10 \mu\text{g/ml}$  (lipopolysaccharid)

Suspended layer was used for preparation of media with different concentration, 0, 50, 100, 200  $\mu\text{g/ml}$

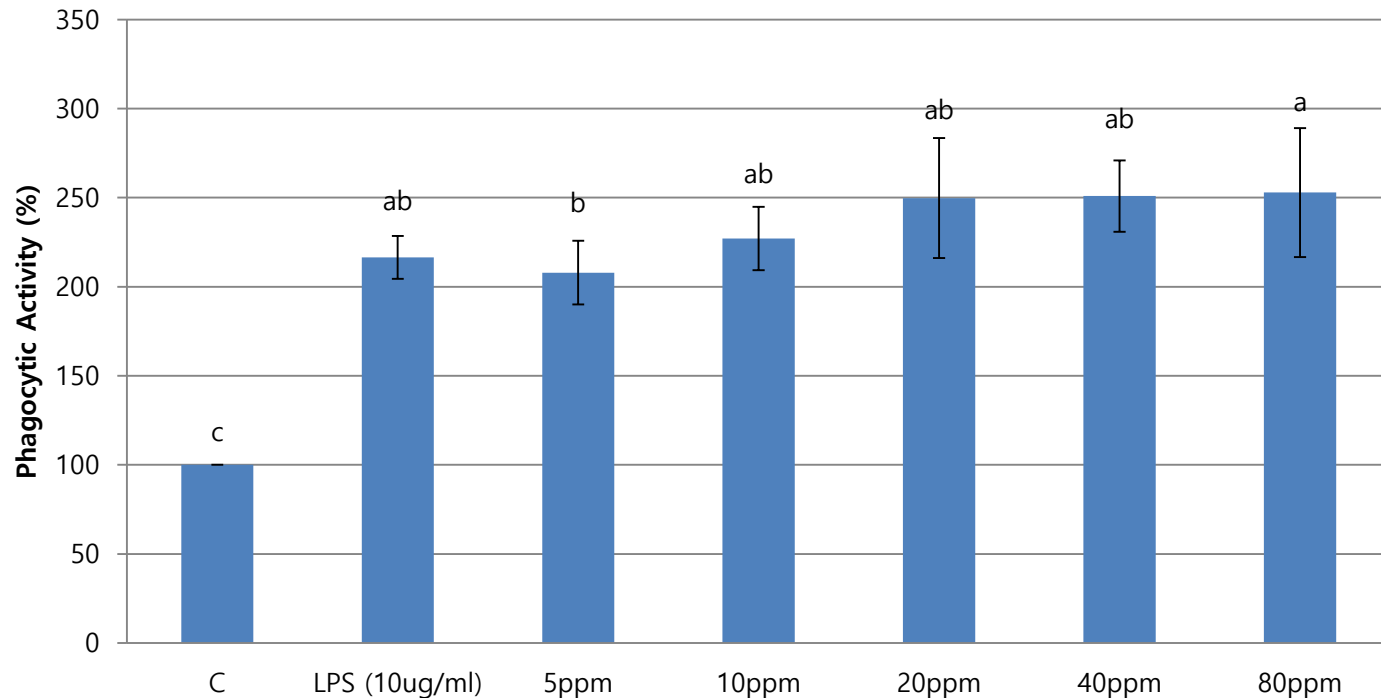
Incubated at 37 °C with 5 % CO<sub>2</sub> for 24 and 48 hours.

Absorbance was measured by ELISA reader at 450 nm wavelength

10  $\mu\text{l}$  of CCK-8 solution were added to each well and incubated further for 2 hours.

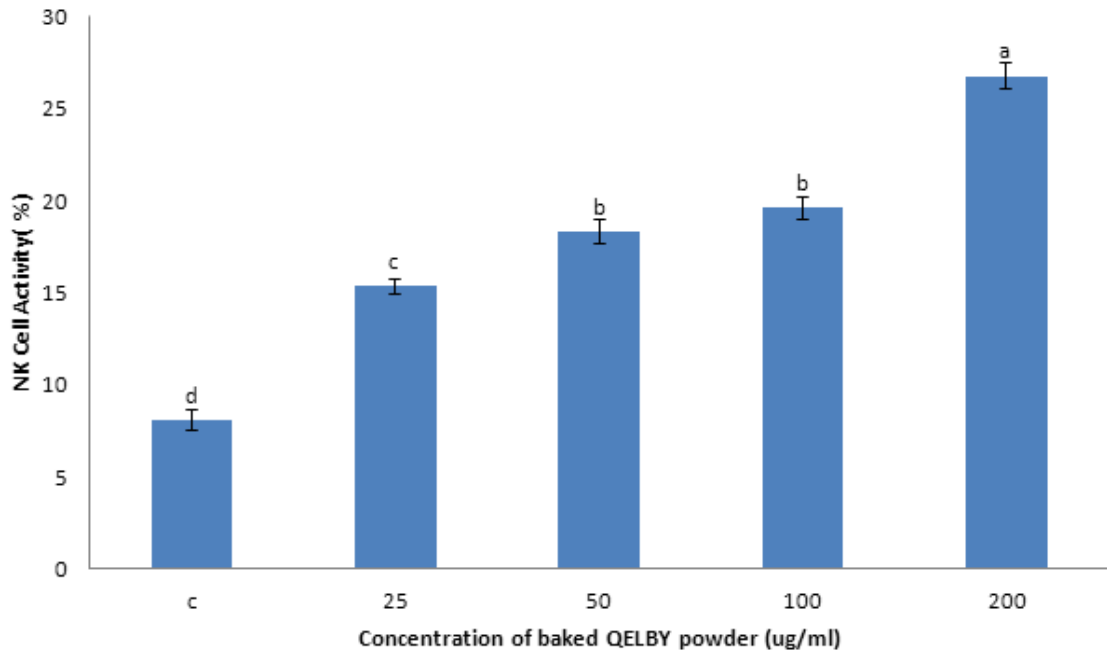
# Increase of cell viability ; Phagocytic activity

Directly treated (Suspended layer)



**Figure 1. The Effect of Qelby (colloid) supplementation on the phagocytic activity of RAW264.7 cells treated for 24 hours (Feb 26, 2014 data). Data are means  $\pm$  SE ( $n=5$ ). Means with different superscript are significantly different at  $p \leq 0.05$ .**

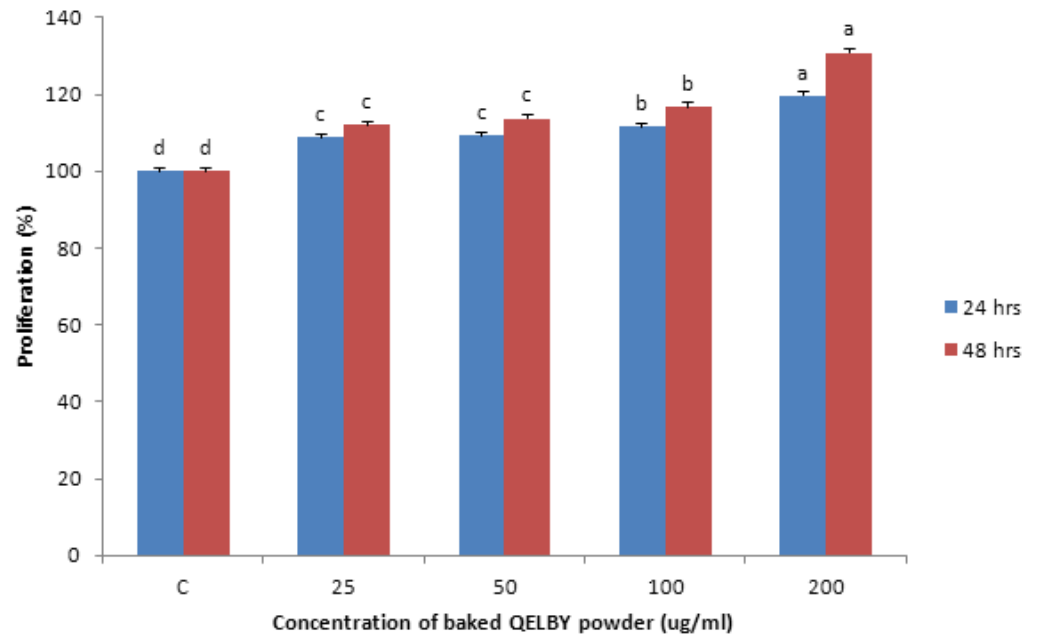
LPS(10 $\mu$ g/ml) was used for positive control.



NK cell proliferation rate

Directly treated DW was used for the preparation of DMEM culture.

Spleen cell proliferation rate





## Suppression of cancer cell (Directly treated)

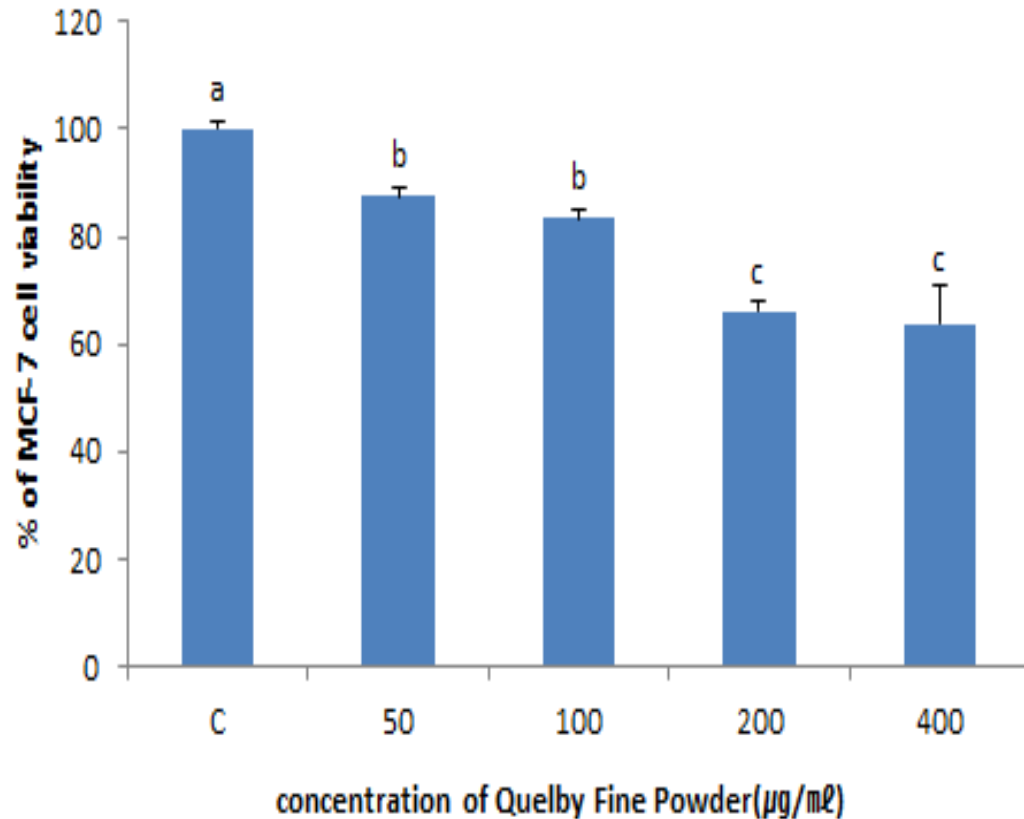
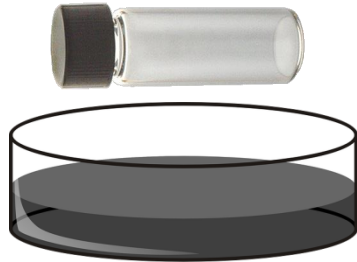
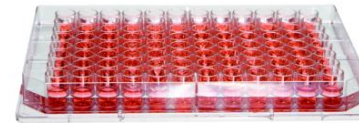


Fig 1 . Cell viability by the treatment of Quelby Fine Powder in MCF-7 breast cancer cells. Quelby fine powder was well mixed and stood for 24hours and the suspended layer was used for the treatment with different concentration(50, 100, 200, 400  $\mu\text{g}/\text{ml}$ ). Data are mean  $\pm$  SE(n=4). Means with different superscript are significantly different at  $p < 0.05$ .

# Indirect treatment of water



50 ml of DW in a vial was exposed for 2 or 4 days.



Seeded in a 96 well plate at a density of  $1 \times 10^4$  cells/well. Allowed to adhere for 3 hours.

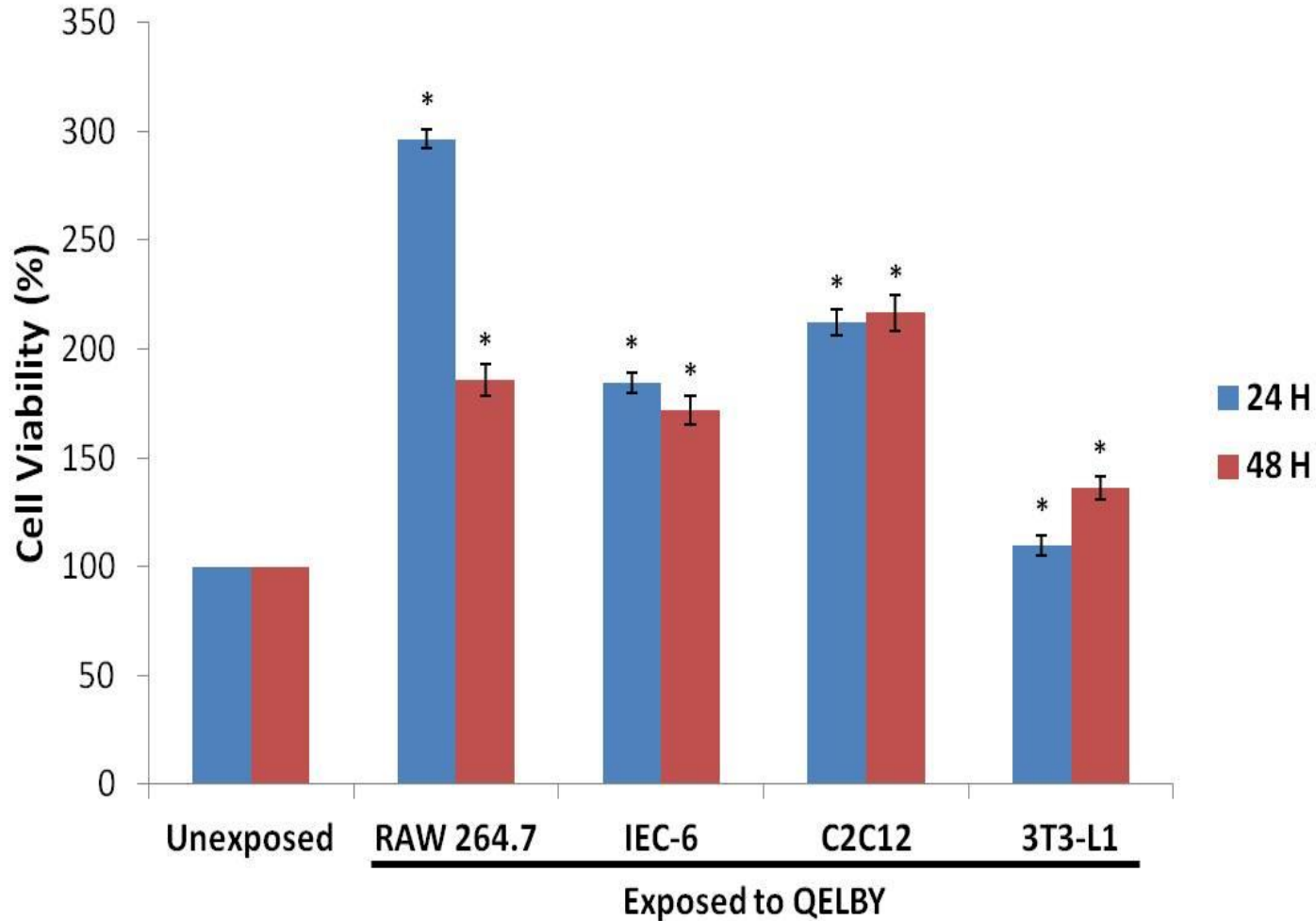
Absorbance was measured by ELISA reader at 450 nm wavelength

Treated with LPS  $10 \mu\text{g}/\text{ml}$  (lipopolysaccharid)

10  $\mu\text{l}$  of CCK-8 solution were added to each well and incubated further for 2 hours.

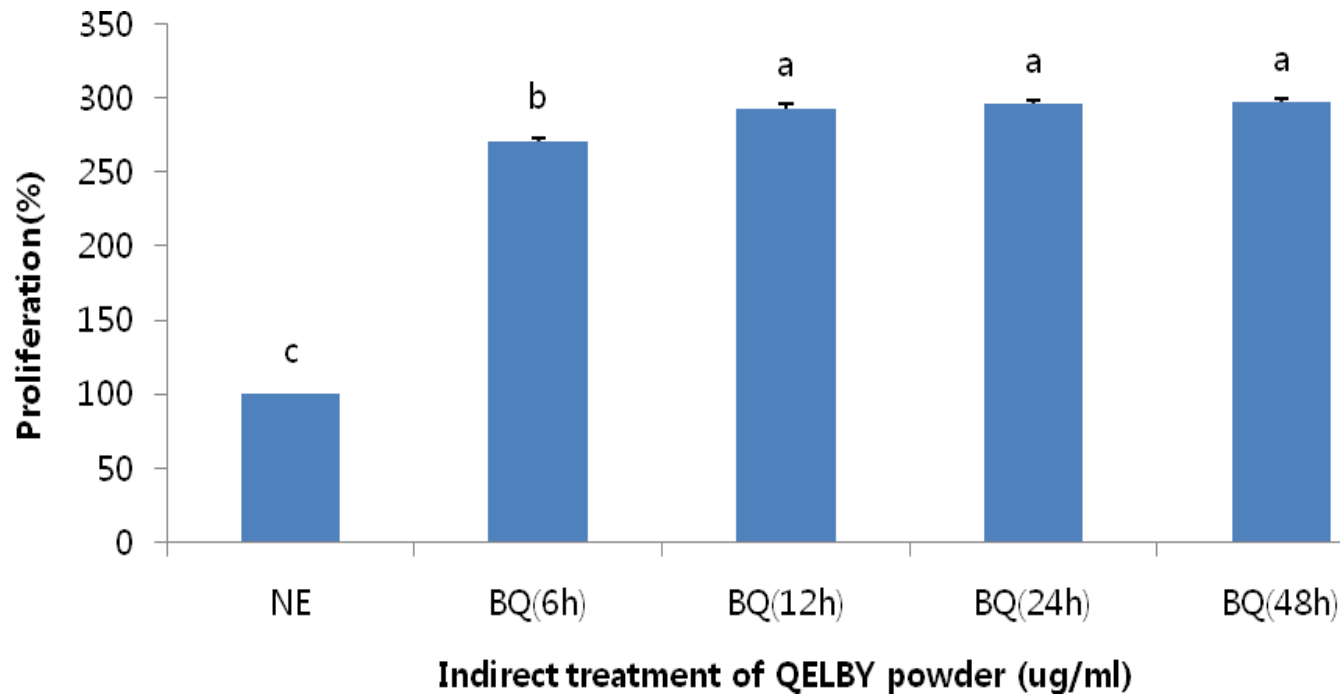
Incubated at  $37^\circ\text{C}$  with 5 %  $\text{CO}_2$  for 24 and 48 hours.

## Non-contact treated DW with Qelby powder

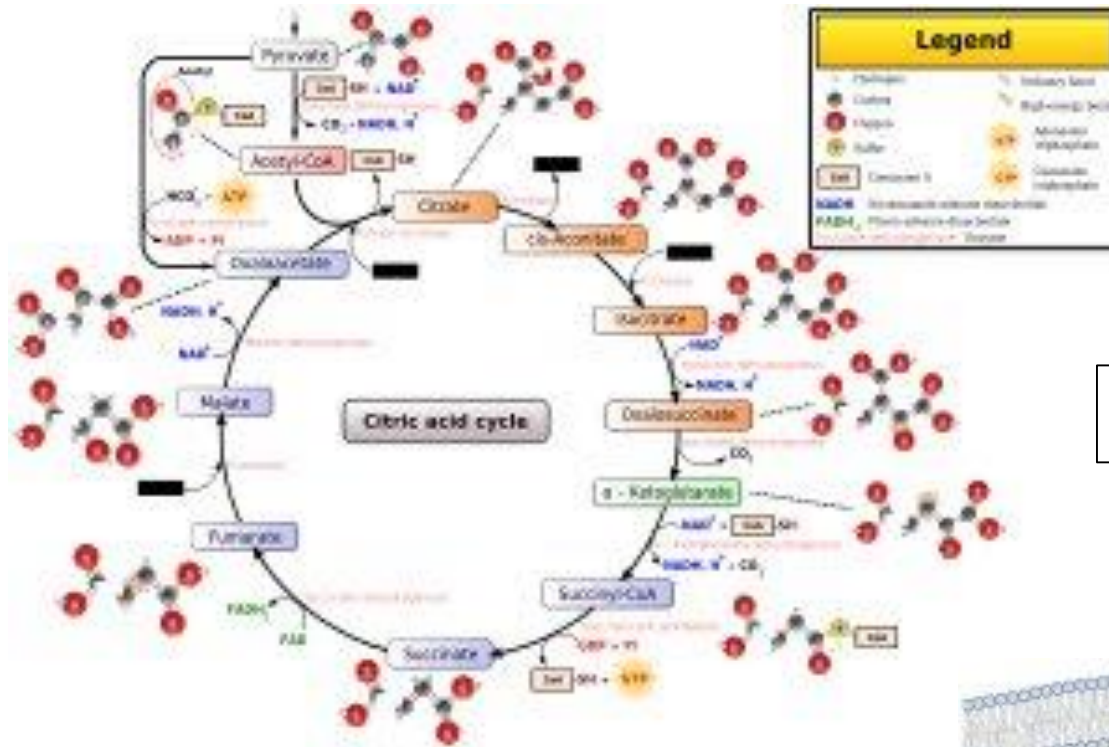


Effect of QELBY powder exposure on the cell viability of RAW 264.7 (macrophage), IEC-6 (intestinal epithelial), C2C12 (myoblast) and 3T3-L1 (preadipocytes) cells incubated for 24 and 48 hours. Means with (\*) are significantly different against their unexposed counterpart group ( $p < 0.05$ ).

## Distilled water treated in non-contact manner



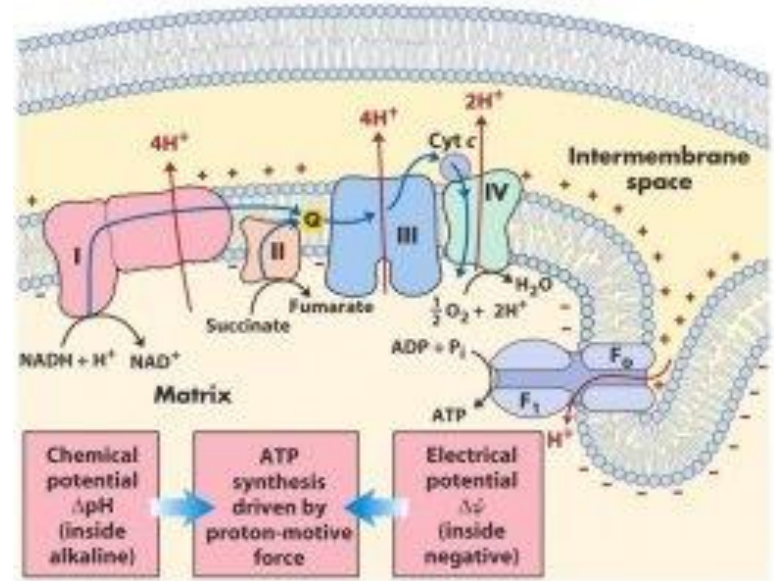
Even after 6 hours of treatment, it was effective in increasing of proliferation rate of macrophage cell cultured in a medium prepared with treated water. It has been increased to almost three times.



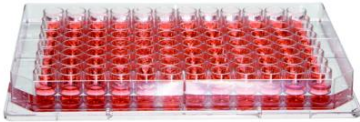
Citric acid cycle

**Electron transport system**

$H^+$  and  $e^-$ , the driving force, are generated when the water is structured.



# Indirect treatment while culturing



Seeded in a 96 well plate at a density of  $1 \times 10^4$  cells/well. Allowed to adhere for 3 hours.

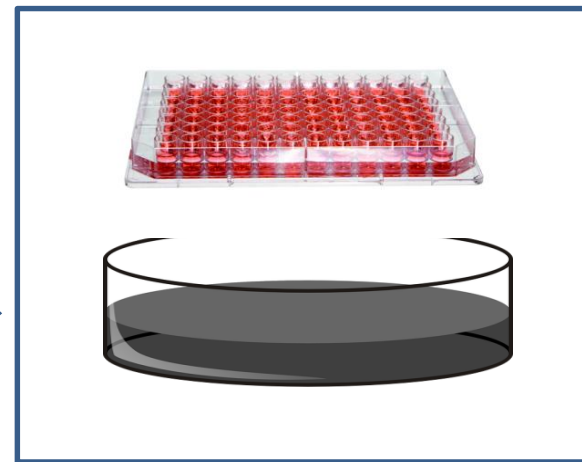


Incubated at 37 °C with 5 % CO<sub>2</sub> for 48 and 72 hours. With and without powder beneath.

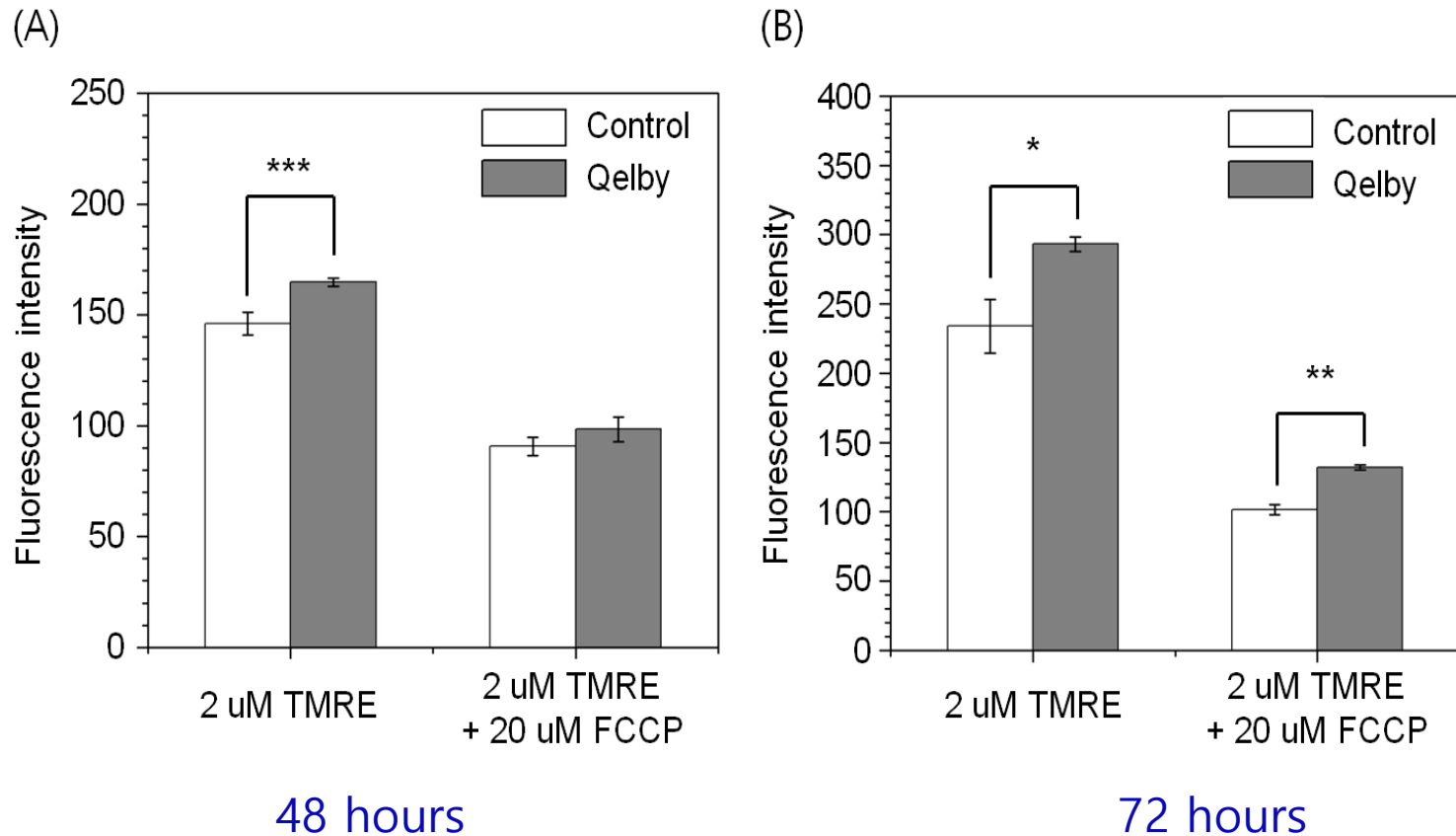


TMRE (ab113852) Mitochondrial Potential Assay Kit

FCCP (ab120081) Potent mitochondrial oxidative phosphorylation uncoupler



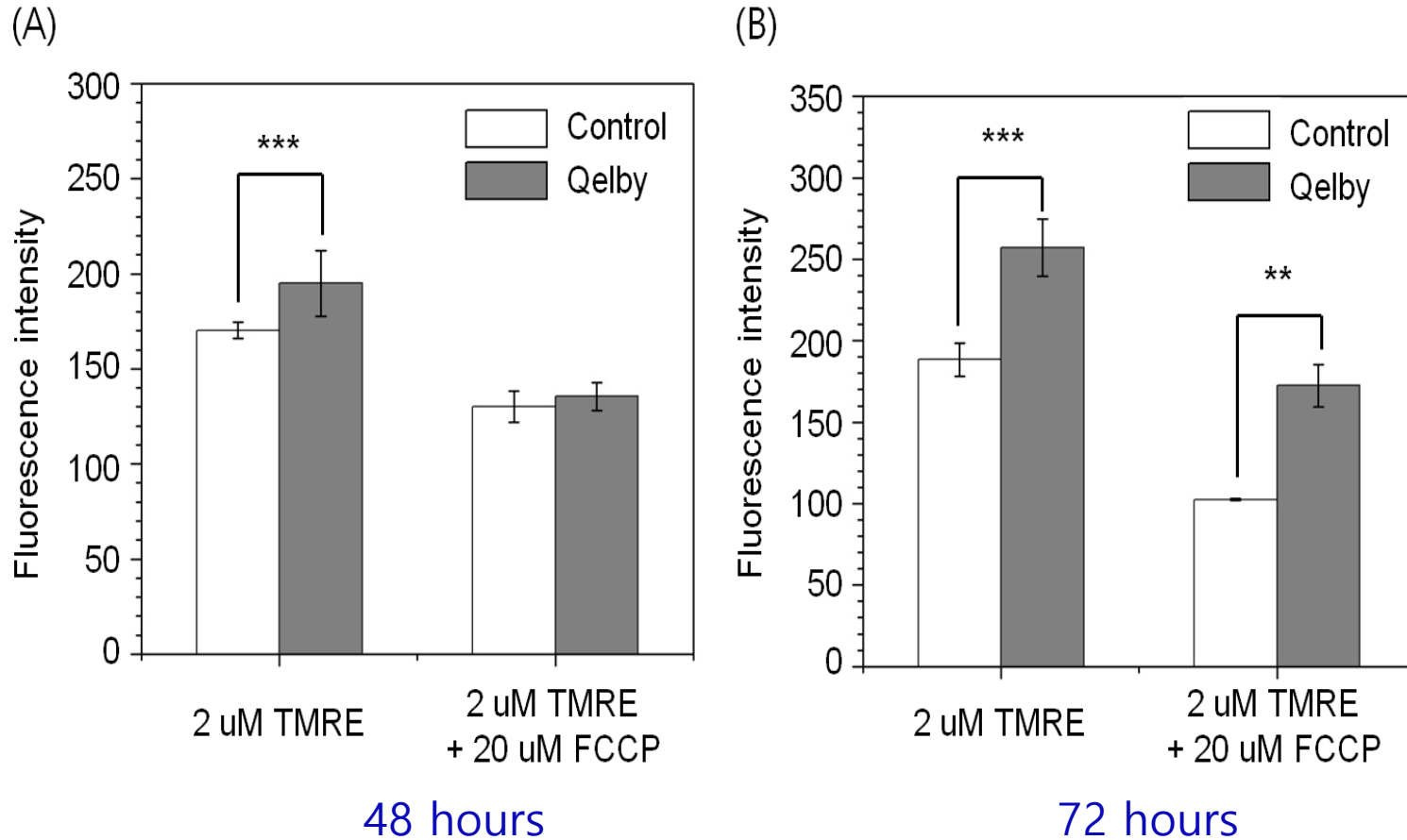
# Mitochondrial Membrane Potential of HD11 cells



Non-contact treatment, for the study on the effect of Qelby powder on MMP after 48 hours(left), 72 hours (right) of exposure.

FCCP: Negative control. \*: p-value < 0.05, \*\*: p-value < 0.01, \*\*\*: p-value < 0.001.

# Mitochondrial Membrane Potential of HeLa cells



Non-contact treatment, for the study on the effect of Qelby powder on MMP after 48 hours(left), 72 hours (right) of exposure.

FCCP: Negative control. \*: p-value < 0.05, \*\*: p-value < 0.01, \*\*\*: p-value < 0.001.



# **Some Examples of Practical Application**

**Cell regeneration**  
**Waste water treatment**  
**Plant growth**  
**Soil recovery**  
**Livestock feed additive**  
**etc.**

# Bed sore (decubitus)

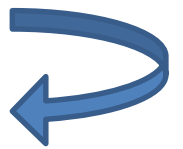
Dermal cells are  
regenerated.



2009. 1. 15.



20 days laer



3 month, cured.



2 month



1 month

# Process of regeneration

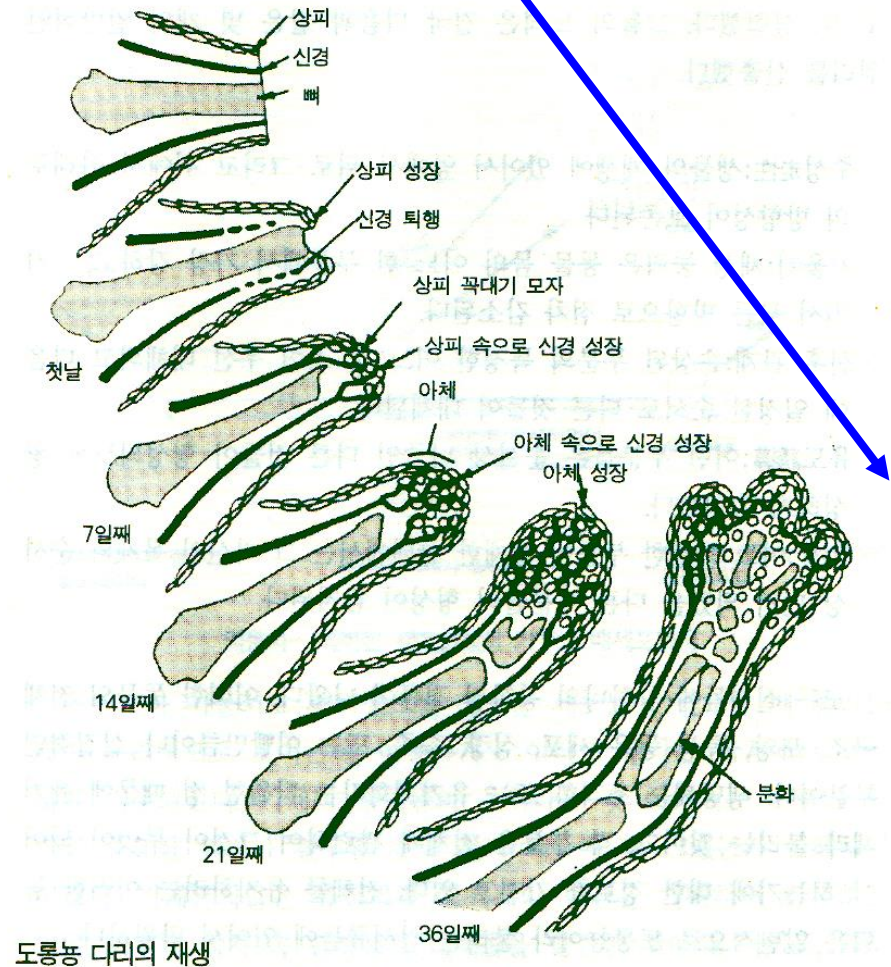
**Dedifferentiation – from specialized cells back to neo-embryonic cells**

**→ Electric potential on the cut stump is essential for regeneration**

“The Body Electric”

Robert O. Becker and Gary Selden

pp. 40 - 76. (1985)



# Application in the Rice field



Green moss covered water



Clear water surface



## Waste water from the cow barn.



From left,  
Pure mineral water, Waste water,  
USAB treated water, Qelby treated water.

Compared to the USAB technology,  
Qelby process has several advantages.

Application of Qelby for the treatment of  
waste water from cow barn. 50 ppm.

**Chinese Academy of Agriculture**

## UASB (Upflow Anaerobic Sludge Blanket) process

Item	COD	TN	NH3-N	TP
Waste water from cow barn	4420	360	205.4	61.5
UASB treatment	739	25	14.4	3.80
Efficiency, %	83	93	92	93

## Qelby process

Item	COD	TN	NH3-N	TP
Waste water from cow barn	7900	364.73	188.31	49.65
Qelby powder treatment*	106	10.40	5.74	6.17
Efficiency, %	98.66	97.15	96.95	87.57

\* 50 ppm x 2 times, analyzed after 20 days later

# **Conclusion**

**New paradigm  
in  
Water Science and Technology.**



## **1. A new model of water structure was proposed**

- PBL model of water structure
- Sponge like morphology with structured water forming the wall.

## **2. Formation of structured water**

- It is possible not only by direct contact but also by indirect contact.
- Mineral components may provide the embryo site for formation of structured water.

## **3. Energy (UV~IR) and water are essential for life.**

- Real energy supply from the structured water.
- Membrane potential can be an indicator of health.



# Qelby

Plausible mechanism proposed for Life metabolism.

## **1. Structured water formation**

- Hexagonal structure, the fourth phase of water

## **2. Potential generation**

- Negative charge on membrane

## **3-1. Activation of cell metabolism**

- Recovery of immunity
- Improved cell regeneration capability

## **3-2. Improvement of blood flow**

- Recovery of health through better oxygen supply



**Korea**

The State University of New York

한국뉴욕주립대학교

History Makers, We Change the World.

**Natural History Maker, Water Makes the World Alive.**

Thank you.