Tatung University map

PBL participants and group members

Group	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6
1	古澤恭太 ふるさわ きようた	曾台緯 David	張耀文 Sam	中川七海	平井彩香	
2	林雨蓁 Chen	林中皓 John	黃致涵 Aslan	岡本秀哉	古賀野 悟士	
3	蘇楷文 Kevin	廖珮妤 東海 fuyumi	李登耀 Daniel	阿南脩人	前川朱理	
4	郭威廷 Vincent	林柏儒 Brian	林宇萱 Maggie	石川裕人	宮下遥名	森有希
5	王淳俊 Jason	曾鈺涵 Cherry	周思汎 Sandy	長瀬幹英	脇地航平	

PBL program coordinators:

Professor Hu, Yi (胡毅) (TTU)

Professor Fujisato, Toshiya (藤里俊哉)(OIT)

PBL group leaders:

Professor Huang, Chun-Cheng (黃俊誠)

Professor Kuan, I-Ching (官宜靜)

PBL program secretary: Ms. Huang, Fong-Yi (黃丰怡)

PBL program assistant: Maggie (林宇萱) and Kevin (蘇楷文)

2018 Tatung University-Osaka Institute of Technology International Project-Based Learning Program Book

August 27~September 01, 2018

Day 1 (Aug. 27, Monday)

13:10~15:10	Flight and Arrival at Taoyuan Airport
16:00~17:00	Take bus to Tatung University
17:00~17:50	Check in Tatung Scholar House
17:50~17:55	Meet in the lobby of Tatung Scholar House
18:00~	Welcome dinner

Day 2 (Aug. 28, Tuesday)

09:00~09:30	Welcoming remarks (in A2-505)
09:30~12:00	PBL demo and experiments
12:00~13:30	Lunch
13:30~14:00	Take MRT to Tamsui (淡水)
14:00~18:00	Visit Tamsui: Fort San Domingo (紅毛城), TamSui Customs Officer's Residence (淡水關稅務司官邸(小白宮), TamSui old street (淡水老街), Fisherman's wharf (漁人碼頭)
18:00~18:30	Take MRT to Shilin Night Market (士林夜市)
18:30~	Visit Shilin Night Market

Day 3 (Aug. 29, Wednesday)

08:50~09:00	Meet at Main gate of Tatung University
09:00~10:00	Take bus to Yilan (宜蘭)
10:00~11:00	Visit Orchid garden of Jiaosi of King Car Group (金車蘭花園)
11:30~12:00	Arrive at Kavalan whisky (噶瑪蘭威士忌酒廠) and watch the introduction video of King Car Group
12:00~13:00	Lunch at the restaurant of Kavalan Whisky
13:00~14:00	Visit the whisky manufacturing factory
14:00~16:00	Take bus from Yilan (宜蘭) to Jiufen (九份)
16:00~18:00	Visit Jiufen
17:30~	Dinner

Day 4 (Aug. 30, Thursday)

9:00~12:00	PBL experiments discussion and preparation of warp-up presentation
12:00~13:30	Lunch
13:30~15:30	Wrap-up presentation (in A8 3F musical hall)
15:30~	Visit Taipei 101, Yongkang Street (永康街) etc.

Day 5 (Aug. 31, Friday)

Free activity

Day 6 (Sep. 01, Saturday)

10:50~12:00	Take bus to Taoyuan Airport
12:00~12:30	Flight Check in
14:20~18:50	Flight and Arrival at Kansai Airport

PBL1~5 demo and experiments

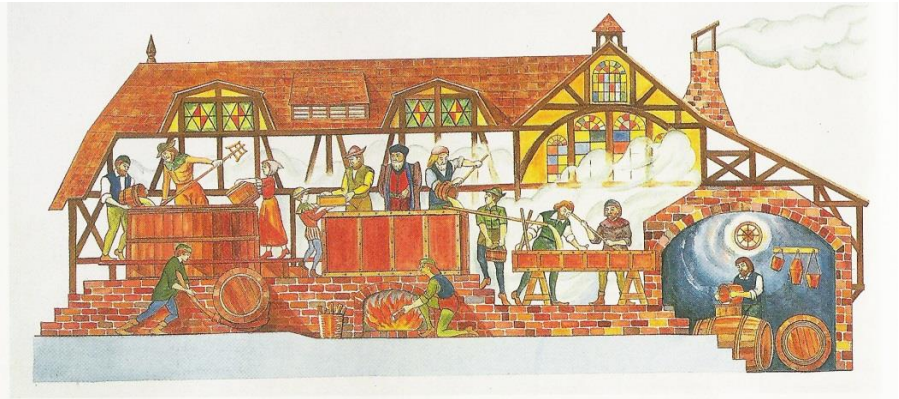
PBL1: Beer workshop

Instructor: Professor Duan, Kow-Jen (段國仁)/Place:A3-804

Introduction

Craft beer, or hand-made beer, is a traditional beer made by monk in an abbey. Nowadays, we define craft beer as a beer that was produced by a microbrewery. Such breweries are generally characterized by their emphasis on quality, flavor and brewing technique.

You can be a brewmaster if you are training in a workshop to learn the basic techniques of mashing , pitching , fermentation and bottling condition.



修道院の醸造風景

The beer workshop starts from introduction of ingredients of beer, malts, yeast, hops, water. You may take 3~4 hour to practice mash the wort. We will use a pot and induction cooker to make wort from malts. Of course, to make fine quality wort is the basis to make a good beer. In the wort mashing practice, I will talk about skills to make good quality wort. In addition to wort practice, you will practice yeast pitching, beer fermentation and bottling for secondary fermentation. Each student can take 3 bottles of beer made by yourself to home.

Barley malts: Malted barley contains all necessary nutrients for yeast. The malted barley contains the necessary enzymes to hydrolyze starch and protein to fermentable sugars, amino acid, soluble proteins, and polysaccharides that will retain in the beer.

Yeasts: Yeast eats sugar to make alcohol is the basis of beer fermentation. Saccharomyces cerevisiae is usually used in beer fermentation. A yeast beer is characterized by its sugar digest and flocculation abilities, and flavors to produce.

Hops: Hops gives characteristic bitterness and flavors of beer. In the early years, hops were used for bacteriostatic purpose. Hop is added to wort at boiling for one hour. During hop boiling, alpha-acids are isomerized to more bitter iso-alpha-acid. Ten min before ending of wort boiling, aroma hop is added to the boiling wort, and then the wort is cooled to the pitching temperature around 10~25^{o}C.

PBL2: Preparation of high moisture mask and lotion with surfactants

Instructor: Professor Wang, Chung-Yih (王鐘毅)/Place:A3-702

Introduction

The stratum corneum (SC) is constantly changing and adapting as people aged. It is now believed that barrier function correlates directly with age the SC is drier in the elderly persons. Reduced SC hydration in the elderly persons would imply that aged skin is less attractive to hydrophilic molecules and to water. Water supplement can be achieved with many skin moisturizing product, such as mask, serum and lotion.

You will learn the effective ingredients that help to retain water in SC. To prepare lotion and serum, you need to understand

the role of surfactants and learn how to mix hydrophilic contents and hydrophobic contents with different types of surfactants.

High moisture and smoothing mask

Material of paper:

- Rayon
- Cotton
- Biocellulose

Procedure to prepare the serum of the mask：

1. Weigh Xanthan Gum and dissolve in water to prepare 2% solution (gel like).
2. Weigh Sodium Hyaluronate and dissolve in water to prepare 0.5 % solution (gel like).
3. Weigh the other contents and mix water accordingly. The total weight is 100 g or total volume is 100 mL.
4. Fold the mask paper and insert into the bag.
5. Pour 25 mL of serum into the bag and sealed

INCI NAME	中文名稱	Percentage (%)
Aqua	純水	76.2
Glycerin	甘油	3.0
Butylene glycol	丁二醇	5.0
Aloe Barbadensis Leaf Extract	蘆薈萃取液	2.0
Chamomilla Recutita Flower Extract	野生洋甘菊萃取液	1.0
Xanthan Gum (2%solution)	三仙膠	10
Phenoxyethanol, Ethylhexylglycerin	複合型抗菌劑	0.25
Chlorphenesin	防腐劑	0.20
Sodium Hyaluronate (0.5 % solution)	玻尿酸鈉	2

Moisture lotion

1. Weigh contents of group A and dissolve in water.
2. Weight contents of group B and add to group A. Mix well.
3. Weigh contents of group C and add to group (A+B). Heat the mixture if necessary.
4. Cool down to below 40^{o}C and add item D. Agitate well and transfer to clean bottle.

	INCI NAME	名稱	投放量
A	Hyaluronic acid (0.5%)	玻尿酸(0.5%)	10 mL
	Glycerol	甘油（丙三醇)	2 mL
	Aqua	純水	74 mL
B	Surfactants	簡易乳化劑	2 mL
C	Vitamin E	維他命 E	1 mL
	Olive oil	橄欖油	10 mL
D	Phenoxyethanol	苯氧乙醇	1 mL
	Perfume	香精	2 drops

PBL3: Synthesis of magnetic nanoparticles

Instructor: Professors Yu, Chi-Yang (游吉陽) and Kuan, I-Ching (官宜靜) /Place:A3-806

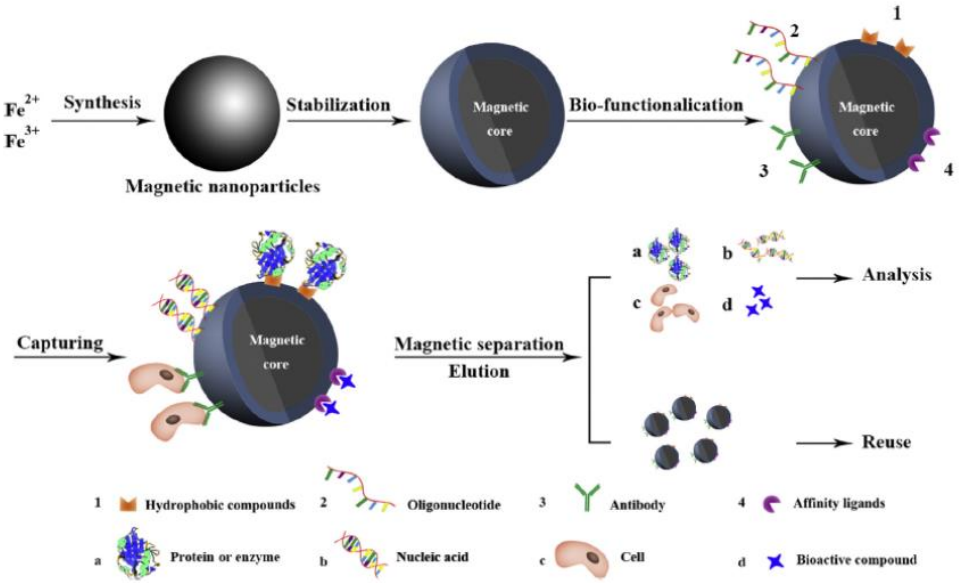
Introduction

Magnetic nanoparticles are of great interest for researchers from a wide range of disciplines, including magnetic fluids, catalysis, biotechnology/biomedicine, and environmental remediation. In most of these applications, the particles perform best when the size of the nanoparticles is below a critical value, which is dependent on the material but is typically around 10–20 nm. While a number of suitable methods have been developed for the synthesis of magnetic nanoparticles of various different compositions, successful application of such magnetic nanoparticles in the areas listed above is highly dependent on the stability of the particles under a range of different conditions.

Synthesis

Magnetic nanoparticles have been synthesized with a number of different compositions and phases, including iron oxides, such

as Fe_3O_4 and γ-Fe_2O_3, pure metals, such as Fe and Co, spinel-type ferromagnets, such as $MgFe_2O_4$, $MnFe_2O_4$, and $CoFe_2O_4$, as well as alloys, such as $CoPt_3$ and FePt. Several popular methods including co-precipitation, thermal decomposition and/or reduction, micelle synthesis, hydrothermal synthesis, and laser pyrolysis techniques can all be directed at the synthesis of high-quality magnetic nanoparticles. In this experiment, we will prepare the Fe_3O_4 magnetic nanoparticles using the method of co-precipitation.



PBL4: inorganic nanoparticle for gene delivery

Instructor: Professor Wu, Hsi-Chin (吳錫芩)/Place: A7-210

Introduction

The calcium phosphate transfection method for introducing DNA into mammalian cells is based on forming a calcium phosphate-DNA precipitate. The standard CaP transfection method is very easy and straightforward which originally discovered by Graham and van der Ebb (1) and was later modified by Wigler (2). The procedure is routinely used to transfect a wide variety of cell types for transient expression or for producing stable transformants. By mixing of calcium chloride solution with DNA and a subsequent addition of phosphate-buffered saline solution results in the formation of fine precipitates (nano- and microparticles). Calcium phosphate transfection complex facilitates the binding of the DNA to the cell surface. DNA then enters the cell by endocytosis for transient expression.

Procedure

1. Preparation cultured cells
2. Calcium phosphate-pEGFP transfection
3. Fluorescence microscopic examination

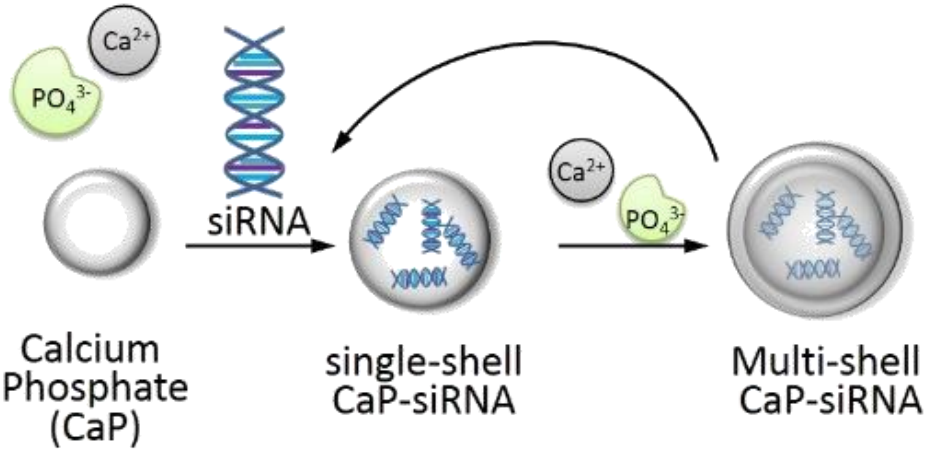


Figure 1. Schematic illustrations of multi-shell CaP-pEGFP nanocarrier

References

1. Graham, F. L. and van der Ebb, A. J. (1973) Virology 52: 456.

2. Wigler, M. et al, (1977) Cell 11: 223.

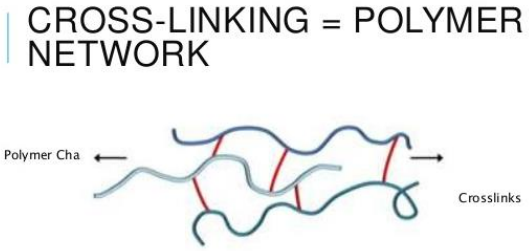
3. Invitrogen™ Calcium Phosphate Transfection Kit

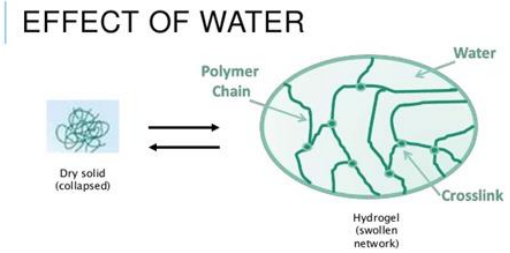
PBL5: Synthesis and Applications of Hydrogel Materials

Instructor: Professor Lee, Wen-Fu (李文福)/Place:A2-305

Introduction

The term 'hydrogel' first appeared in the literature was in 1894. It is defined as a hydrophilic three-dimensional network of polymer chains which can swell but not dissolve in aqueous solution.





Hydrogels are highly absorbent material due to their hydrophilic structure. It can absorb plenty of water (up to one thousand times their dry weight) and hold water inside the

structure. This property along with biocompatibility of hydrogel results in numerously applications in contact lenses, tissue engineering, and many biomedical fields. Other common applications of hydrogels include:

Pharmaceutical Agriculture

Sanitary pads Trans-dermal systems

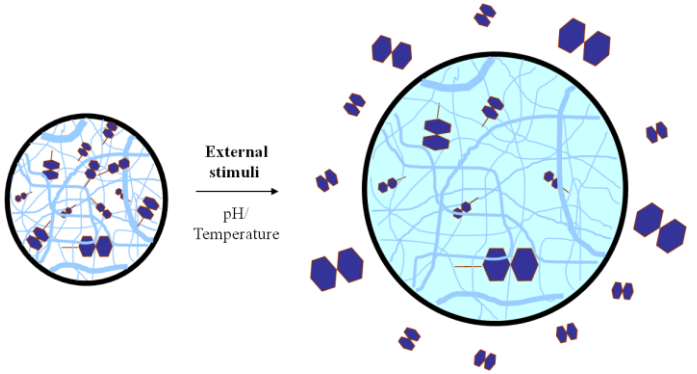
Dental materials Drug delivery

Implants Injectable polymeric systems

Ophthalmic applications

Wound dressings

Hydrogels can be designed to be stimuli sensitive and respond to surrounding environment. These hydrogels can perform dramatic volume transition in response to a variety of environmental stimuli like temperature, electric or magnetic field, light, pressure, sound, pH, solvent composition, ionic strength, and molecular species. And these stimuli-response properties can be applied on the drug releasing system and biosensor.



Preparation of hydrogel

NIPAAm, NMBA, and APS are added into the sample bottle with the amounts according to the Table 1. Water is added into the bottle until the total volume of solution is 20 mL. After that, the bottle is placed into ice bath and add 1 drop of TEMED. The solution is then injected into the mold that is immersed in hot

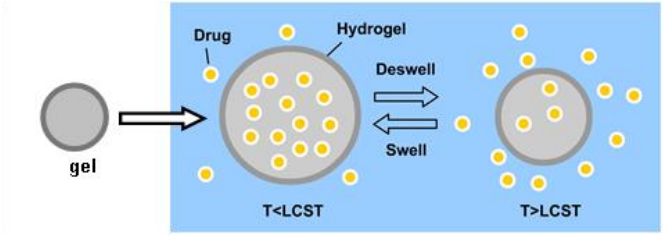
water bath to perform polymerization. After the reaction is finished, the hydrogel is cut into disks and washed by distilled water/methanol. Finally, the gel disks are dried at room temperature, 40°C and 75°C, respectively.

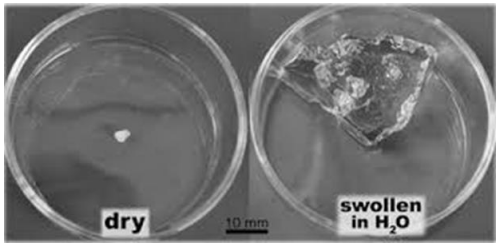
Table 1 Feed compositions of different hydrogels

Gel code		NIPAAm (g)	NMBA (g)	APS (g)
G1	Designed	2.712	0.111	0.026
	Actual			

Demonstration of hydrogel features

- Swelling behavior
- Temperature response
- pH response
- Drug absorption





Measurement of Swelling Ratio

Weight of dried gels (W_d) are measured at first. And the gels are immersed in distilled water at 25°C. The gels are removed from the water bath and measured the weight of wet gel (W_w) at various time intervals. The swelling ratio (SR) was calculated by the following equation:

$$SR = \frac{W_w - W_d}{W_d}$$

Table 2 Weights of different gels at different times

Time (min)	G1 (g)
0	
10	
20	
30	
40	
50	
60	

Swelling behavior observation

Two dry gel disks are placed in air and 25°C deionized water, respectively. After for 10 minutes, weighting and observing the hydrogel.

Temperature response observation

Two hydrogels swollen in deionized water at 25°C are placed in 25°C and 37°C deionized water, respectively. After 10 minutes, the hydrogels are weighed and observed the difference.

Drug Release Experiment

The drug (crystal violet/ phenol red) release experiments are carried out by transferring previously incubated-drug hydrogels into 10 mL deionized water at 37°C and 25°C, respectively. The hydrogels are repeatedly removed and transferred into 10 mL deionized water at each fixed time interval. The drug released amounts will be observed via the difference of color.

OIT student accommodation in TTU gest house

Room No.	IP address	Student names	
202	140.129.7.179 140.129.7.180	阿南脩人	石川裕人
204	140.129.7.181 140.129.7.182	岡本秀哉	古賀野悟士
208	140.129.7.189 140.129.7.190	長瀬幹英	脇地航平
210	140.129.7.191 140.129.7.192	前川朱理	宮下遥名
232	140.129.7.195 140.129.7.196	中川七海	平井彩香
		森有希	

Wifi (Connect to “ttuweb” or “ttuwifi”)

User Name	Account	Password	User Name	Account	Password
藤李俊哉	ttube01	ttube01	脇地航平	ttube08	ttube08
川原幸一	ttube02	ttube02	前川朱理	ttube09	ttube09
阿南脩人	ttube03	ttube03	宮下遥名	Ttube10	Ttube10
石川裕人	ttube04	ttube04	中川七海	Ttube11	Ttube11
岡本秀哉	ttube05	ttube05	平井彩香	Ttube12	Ttube12
古賀野悟士	ttube06	ttube06	森有希	Ttube13	Ttube13
長瀬幹英	ttube07	ttube07			