

SDU

Letní škola SDU Odense

Bc. Jana Fojtíková
222897@vutbr.cz





DENMARK

- ★ National capital
- Regional capital
- Town
- ✈ Airport
- International boundary
- Motorway
- Main road
- - - Railroad
- ▬ Ferry

Osnova

Přihlášení

Po přijetí

Ubytování

Můj kurz = Chemical Biology

Společenské aktivity

Odense

Cesta tam a zase zpátky

Přihlášení – co mít připravené

- Letter of Nomination
- English Language Requirement
- Transcript of Records
- Copy of Passport

→ Fees

→ Housing

→ How to apply

→ Life in Denmark

→ Regional strengths


→ Social activities

→ Master's programmes

→ Exchange programmes

→ Contact

https://www.sdu.dk/en/uddannelse/sdu_summer_school

 Our Global Goals

Programmes

Research

Press and News Room

Cooperation

Library

About SDU



Search



Login



Menu

International Summer School > How to apply

Admission

Admission requirements

Selection of students

For international students

Required documents

English skills

For students enrolled at Danish universities

SDU Students - own study programme

Exchange students

For students nominated from partner universities

APPLY HERE

Guest students

For fee-paying students and guest students from Danish universities

APPLY HERE

Po přijetí



Studentská karta – fotka



Ubytování



Studentský účet
– itslearning

Studentský
email



Ubytování

- Pokoje:
 - Type A: Single room with shared bathroom: 2700,- DKK (9400,- Kč)
 - Type B: Single room with bathroom shared with one other guest: 3500,- DKK
 - Type C: Single room and private bathroom: 3900,- DKK
- Free WiFi, prádelna, volejbalové hřiště
- Bez kuchyně – snídaně v ceně
 - obědy/večeře – příplatek (50,- DKK)
- 3 km od univerzity



dalum
landbrugsskole



Accommodation Office at [**bolig@sdu.dk**](mailto:bolig@sdu.dk)

Please write “*Housing for Summer School – city* (Odense or Sønderborg)” in the subject line.

You will need to state the following things:

- Full name
- Male/female
- Nationality
- Arrival date
- Departure date
- 1. priority for room (place and type)
- 2. priority for room (place and type)
- Summer School Course you have applied for
- If your preferred room offers optional linen and breakfast, please also specify whether you want to add linen and breakfast to your reservation.

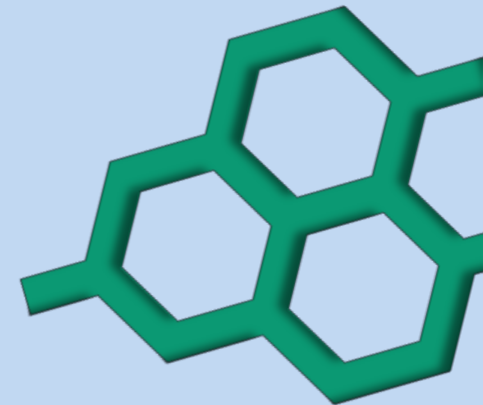
Chemical Biology

- 1 týden

- Dopolední blok – přednášky
 - DNA – DNA synthesis (Lou)
 - Proteins – Histone peptidomimetics (Mecinovic)
 - Enzymes – Immobilised enzymes (Wu)
 - Lipids – Liposome fusion (Löffler)
- Odpolední blok – zpracovávání článků a prezentace
- Výběr projektů

- 2 týden

- Po, Út, (St) – laboratoř
- Čt – příprava prezentací, plakátů a abstraktů
- Pá – prezentace výsledků, rozlučková recepce





Enzyme immobilization by physical adsorption and entrapment
 Authors: Martyna Krupowicz, Julia Tuominen, Jana Fojtiková, Kirill Mitusov
 Changzhu Wu, Lab, SDU

Introduction
 Enzymes show extremely high activity and structural specificity under physiological conditions. The free state of enzyme is less stable and its separation and recycling is difficult. The immobilization is the most used strategy, enabling reuse and easy separation of enzyme from soluble products, thus simplifying the process, while enhancing its stability. In this project two techniques of immobilization were used to study the enzymatic activity of *Candida Antarctica Lipase B (CALB)* during esterification. First one uses physical adsorption of enzyme on the surface of silica nanoparticles (NPL), while in the second one the enzyme is entrapped in the alginate gel beads (GB) network.

Steps

1. Synthesis of silica nanoparticles and nanocarriers (nsp, gb)
2. Synthesis of gel beads (nsp, gb)
3. Bradford assay
4. Esterification reaction
5. Gas Chromatography measurement

Results

Immobilization efficiency
 The Bradford assay was performed by mixing Bradford reagent with the protein sample and measuring the absorbance at 595 nm to check the immobilization efficiency of enzymes. In the gel beads that was about 90%, but in the case of nanoparticles it was almost 99%.

Enzyme activity
 To test the activity of immobilized enzymes, esterification reaction was performed by mixing octanoic acid (1) and 1 octanol (2) in n-octane using immobilized enzymes as catalyst.

Figure 3. Reaction scheme

After the esterification reaction gas chromatography was performed to determine the concentration of the products, n-octyl acetate, in samples collected after 30, 60 and 120 minutes. For GB the specific activity was 7,30 u/mg and for NPL it was 11,073 u/mg.

Figure 8. Graph of immobilization efficiency in gel beads and nanoparticles

Method	Efficiency (%)
GB	~90
NPL	~99

Size of nanoparticles
 The Dynamic light scattering method (DLS) was used to characterize the size of silica nanoparticles. The radius of nanoparticles prepared by our group was 130 nm and 340 nm.

Conclusions:
 We managed to immobilize CALB-enzymes by two different methods, entrapment in alginate gel and physical adsorption onto silica nanoparticles. Afterwards we measured the immobilization efficiency, which showed up to be higher in nanoparticles than gel beads. The size of prepared particles is in nano-scale, which was proven by the DLS measuring. Ultimately the esterification reaction was performed to test the enzyme activity after immobilization. Based on the data from GC it was determined that the enzyme activity is higher in gel beads that contain water than in nanoparticles where enzyme conformation can be changed by hydrophobic interactions.

References:

1. Zhang, N. et al. Surface-functionalized Mesoporous Nanoparticles as Heterogeneous Supports for Transferable Catalysts and Organic Solvents for Transfer Catalysis. *ACS Appl. Nano Mater.* 1, 6378-6386 (2018).
2. Lian, C. et al. Efficient production of biodiesel by using a commercial lipase immobilized by physical adsorption on mesoporous organosilica materials. *Catalysis* 11, 1287-1291.
3. Koch-Nielsen, A.-C. Cell-Entrapment of 47-48 (2017).

SDU



Společenské aktivity

- So – Registration, Campus Tour
- Ne – Walking Tour Odense
- Út – Speed-friending Night
- Čt – Quiz Night
- So – Visit to Egeskov Castle
- Po – Karaoke Night
- St – Board Game Night
- Pá – Farwell Reception



Odense

- Kultura: H.C.Andersen
- Parky: Munke Mose, Eventyrhaven
- Doprava: tramvaj, Fynbus, autobus
 - Všechny spoje jezdí k vlakovému nádraží, tam je možné přesehnout. Rychlejší je kolo nebo chodit pěšky.
- Jídlo: Storm's Pakhus





Danmark
(Denmark)

A

Nykøbing Aars
Hobro
Lemvig Skive
Viborg
Struer
Randers Grenå
Holstebro Karup J Randers SV
Ringkøbing Herning Silkeborg Aarhus
Beder Malling
Horsens
Vejle
Kalundborg
Helsingborg Hillerød
Roskilde København Lund
Esbjerg V Varde Esbjerg N Esbjerg Kolding Odense SV Malmø
Esbjerg Ribe Haderslev Odense SV Slagelse Køge
Sylt Tønder Åbenrå Svendborg Næstved
Leck Flensburg Guldborg
Husum Fehmarn
Sassnitz

E45

E4

E22

E55

E47

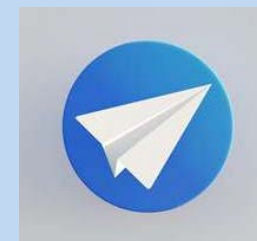
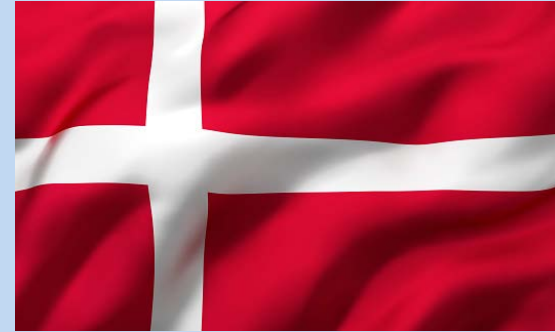
Cesta tam a zase zpátky

- Vlák – z Odense do Kodaně (přímó)
- Vlák (Vejele) + autobus (Billund letiště)
- Letadlo
 - Kodaň
 - Billund
- FlixBus
- Auto



Mohlo by se hodit...

- Vlajky všude
- Aplikace na všechno
 - FYNBUS, SDU Map, Telegram
- Kolo má přednost
- Oslavenec nosí dort/koláč





DĚKUJI ZA POZORNOST

