Optimizing Cleaning in Place Processes for API Production

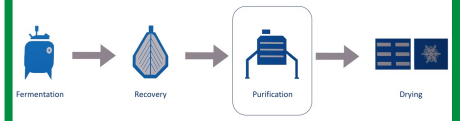
A case of insulin

Christina Papamichail, Serafim Bakalis (KU), Marta González García (NN), Emmanouil Papadakis (NN)

Helix Lab

Introduction

Core production of an API:



Concept of CIP

Cleaning in place process cleans all equipment without disassembling

Purpose of CIP

- Safe and hygienic production
- Facilitates production of multiple products without contamination
- Consistent process performance

Challenges

- Environmental and costs impact
- Production capacity
- CIP knowledge is limited

Purpose of MSc thesis

- Better understanding of CIP process
- Identify challenges in CIP process
- Propose new strategies optimize CIP process

Methods

Data

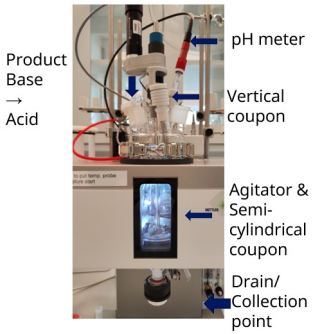
Process understanding

Current state

Theory

Reactor/ Experiments

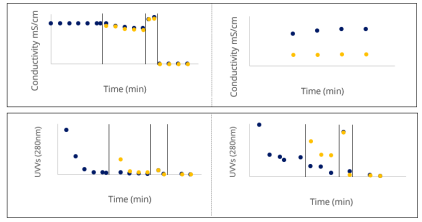
Experimental set up



Outcome

Results

- Quantification of industrial CIP process current state & identification of challenges
- Development of experimental plan
- Experimental optimization of CIP process



Conductivity & UVV measurements for experiment type A compared to the baseline. Right-hand side plots are zoomed in.
Measurements from: ● Baseline ● Exp. A

Impact for the company

- Systematic analysis of the current state of CIP process
- Propose design improvements for future CIP instalments
- Propose potential strategies for optimizing CIP process to be tested in industrial scale

Perspectives

Future research

- Targeted Experiments
- New Experimental Set up
- Study kinetics
- Measurements & Interpretation

Opportunities

- Collaboration of academia and industry
- Facillities and high-tech equipment
- Increase the chances of employment

Future ambitions