We set out to:

- Optimize the polyhydroxy-ß-butyrate (PHB) production
- Express bacteriocins in E. coli
- Create a functional hybrid bacteriocin
- Test bacteriocins on resistant pathogens
- Create a silk-bacteriocin hybrid

"Antibiotic resistance is one of the biggest threats to global health today. It can affect anyone, of any age, in any country."
- World Health Organization

The strongest promoter does not produce the largest amount of plastic. This was determined by Flow Cytometry.

Intein Purification

We cloned and purified the bacteriocins using the IMPACT Method (Intein Mediated Purification with an Affinity Chitin-binding Tag). Isopropyl-ß-D-thiogalactopyranoside (IPTG) is added to induce protein expression. The intein-bacteriocin protein is extracted by the use of Triton x-100. The intein is induced by a thiol agent (DTT), thus the native bacteriocin elutes. Final bacteriocin concentration is determined by using a Bradford Protein Assay with BSA.

Hybrid Bacteriocins = Enhanced MRSA inhibitors

We wanted to test if the silk-bacteriocin hybrid would still be a functional bacterial inhibitor. Unfortunately the assembly method does NOT allow for components that expired 12 years ago... Now we know...

We performed a MIC test on the purified bacteriocins. In some cases, the hybrid bacteriocins are more effective than a single protein. Most importantly, we showed how bacteriocins could form a hybrid with highly charged ionic surfactants which can be sprayed as sprays.

Bacteriocins are rather attractive as possible new antimicrobial compounds, as they are seldom developed resistance against.

Why silk?

- Angiogenic properties
- Can be combined with bacteriocins
- Immunoneutral
- Proliferative effect on keratinocytes

We created a PHB plastic promoter/RBS library, identifying the BioBrick promoter that produced the highest level of PHB. We analyzed different purification methods with regards to purity, yield and ease of large scale production.

Here the plastic is printed as a part of a polymeric implant that could be broken down slowly under the healing process of the bone.