



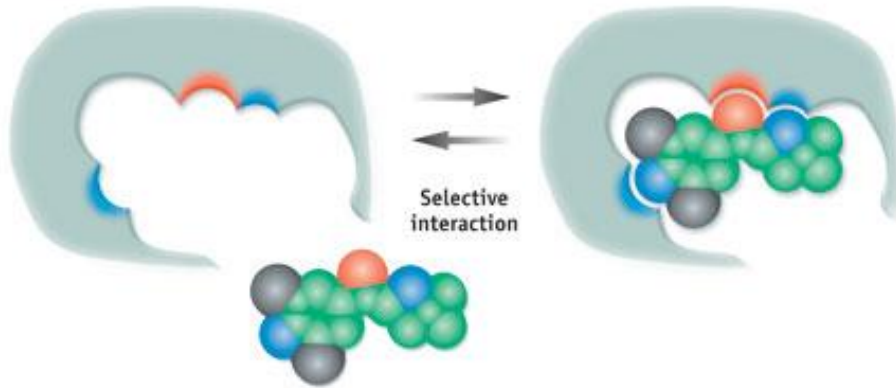
# INOFEA

empowering enzymes

DECHEMA Praxisforum  
Enzymes for Industrial Applications  
Frankfurt, November 8-9, 2016

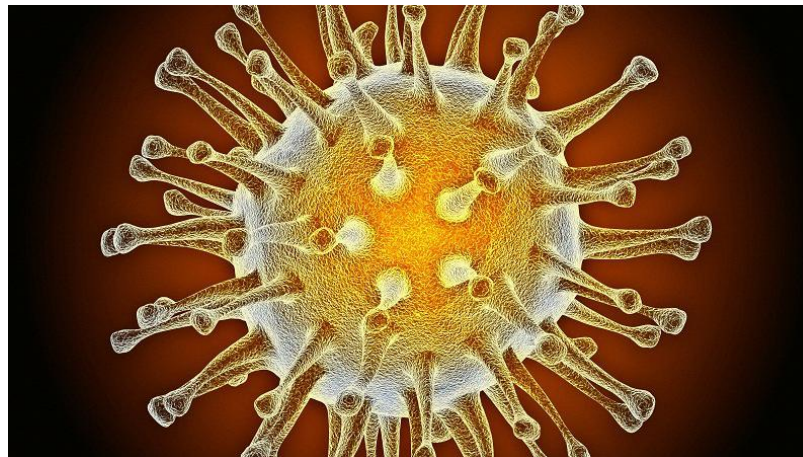
# How it all started

## Molecularly Imprinted Polymers (MIPs)

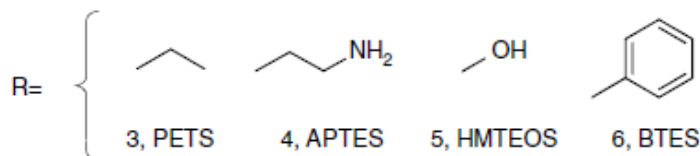
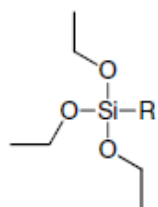
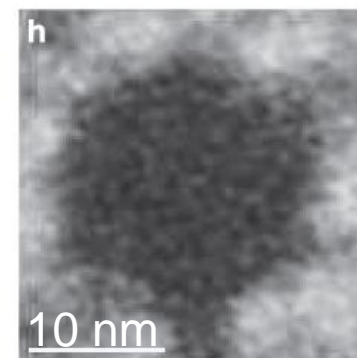
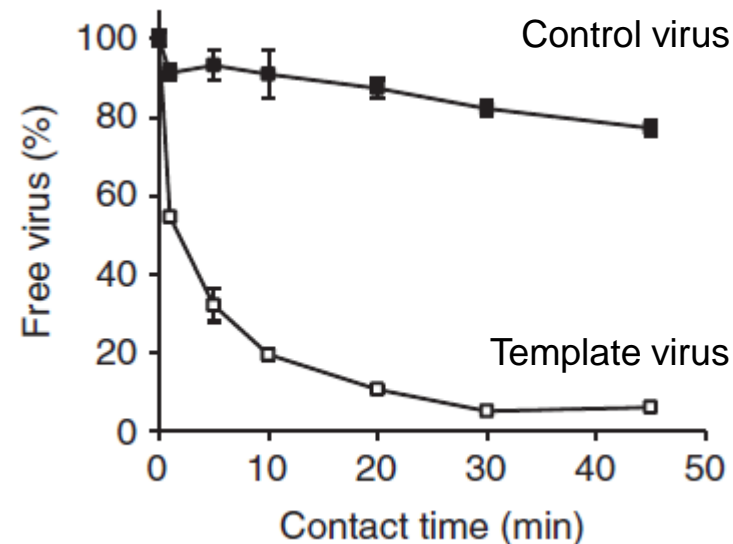
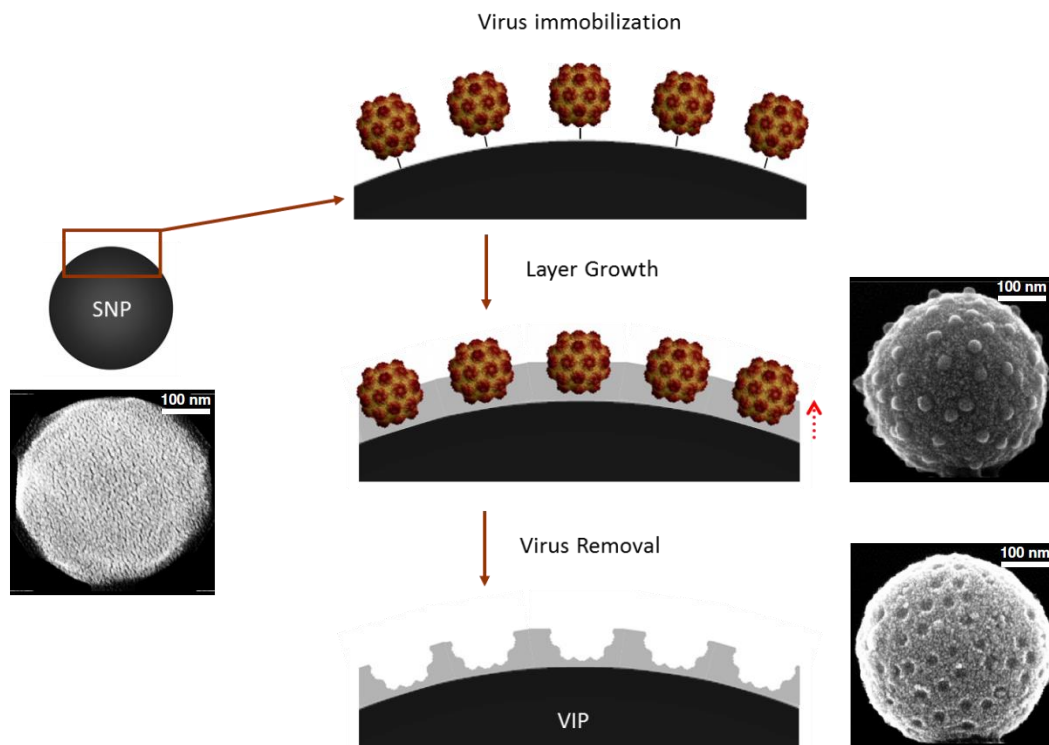


Dr Patrick Shahgaldian

Could you design a MIP for a virus?!



# Virus Imprinted Particles (VIPs)





# A scientific breakthrough

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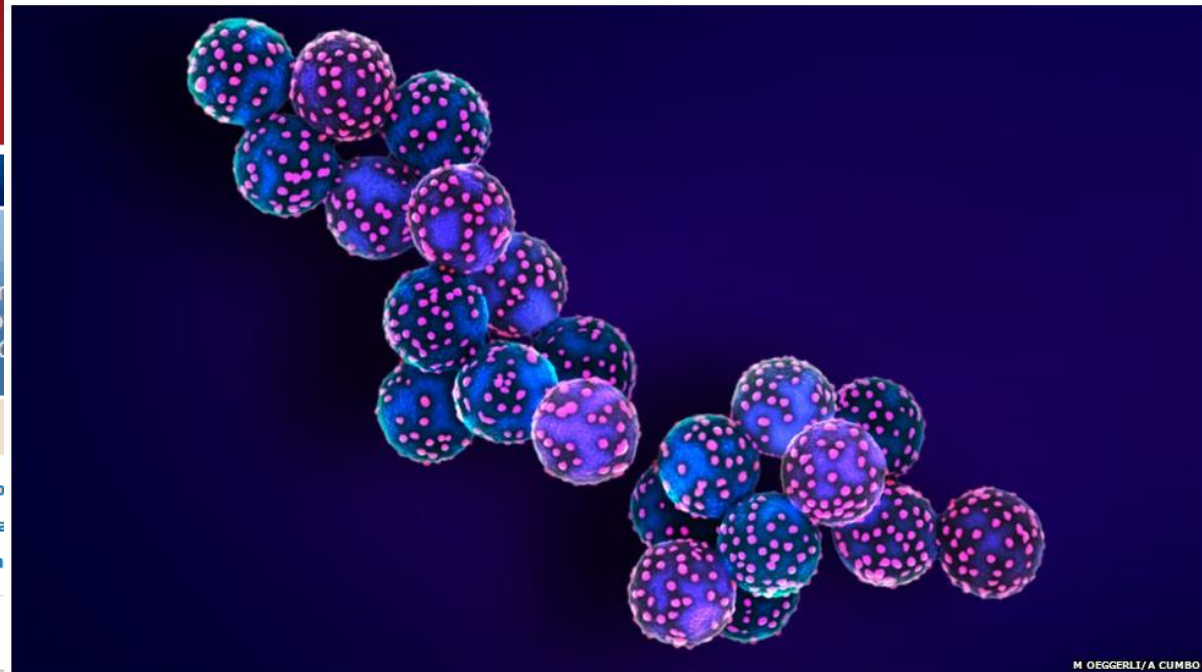
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**BBC AUTOS** **FUEL FOR THE OPEN ROAD.** VISIT BBC AUTOS >

19 February 2013 Last updated at 17:09 GMT

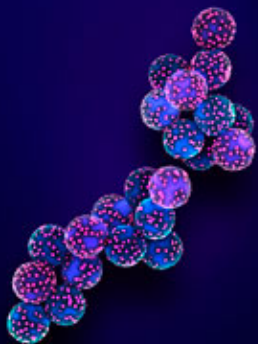
3 Share f t e

## Big Picture: Virus-catching particles made



nature.com

20 February 2013



Alessandro Cumbo/Martin Oeggerli

### Materials

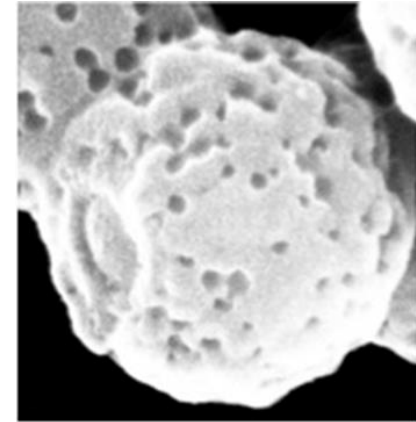
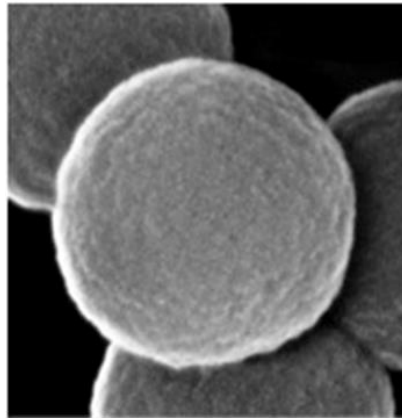
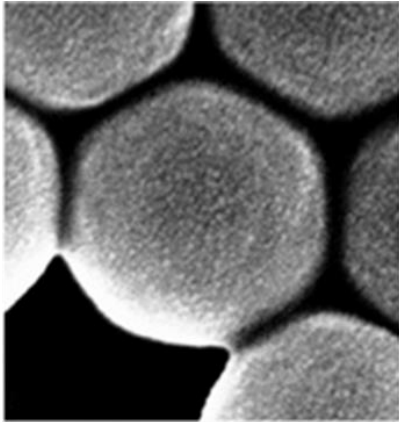
A strategy for making materials capable of reported in *Nature*

### Latest news

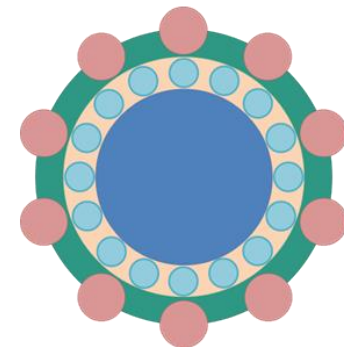
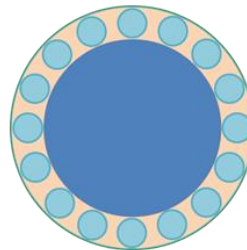
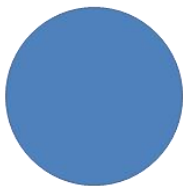
- Predictable evolution
- Gene sequencing leads
- Seed-patent case in

M OEGGERLI/A CUMBO

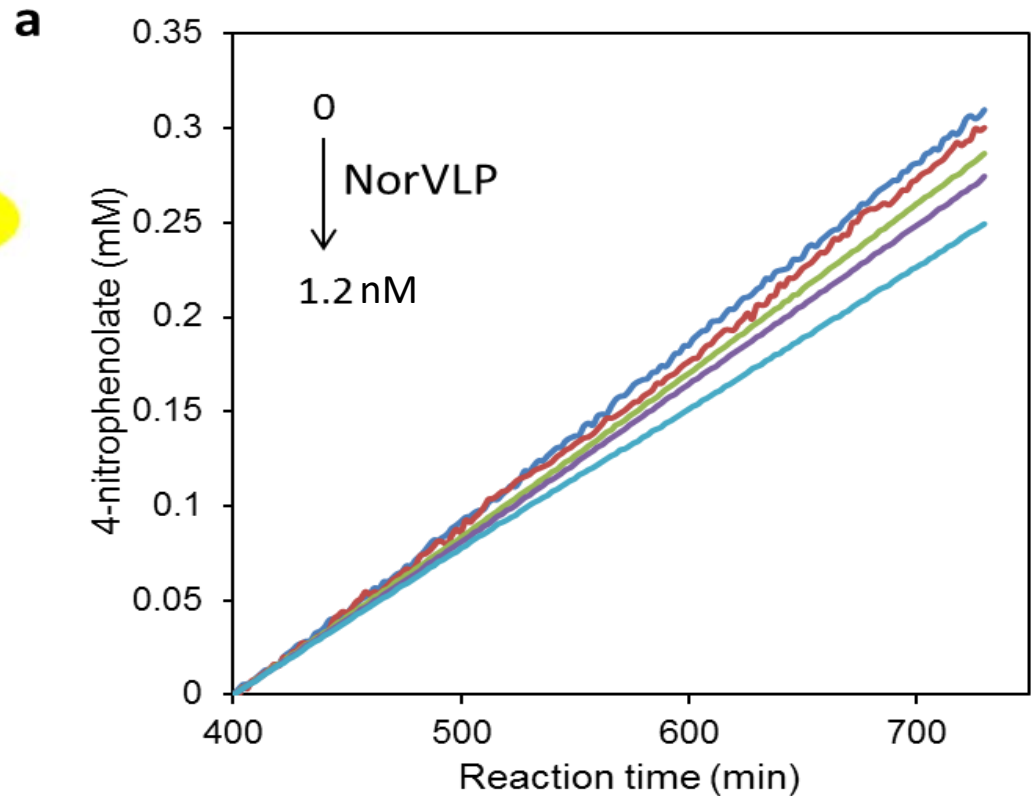
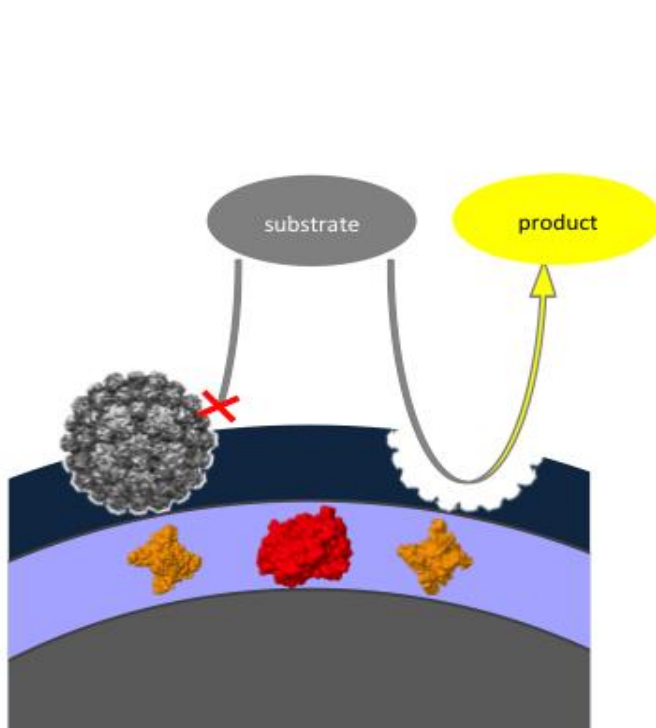
# Draw me an assay!



Enzyme layer to signal the binding event

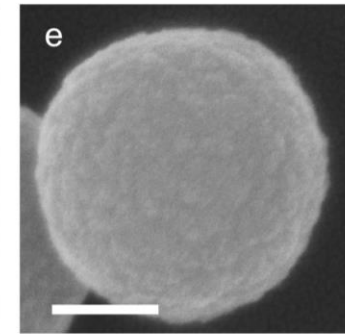
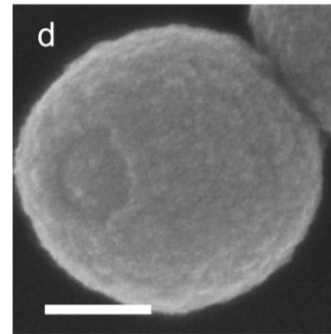
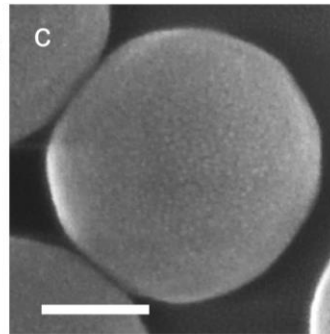
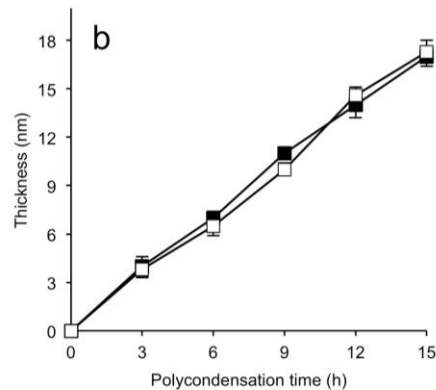
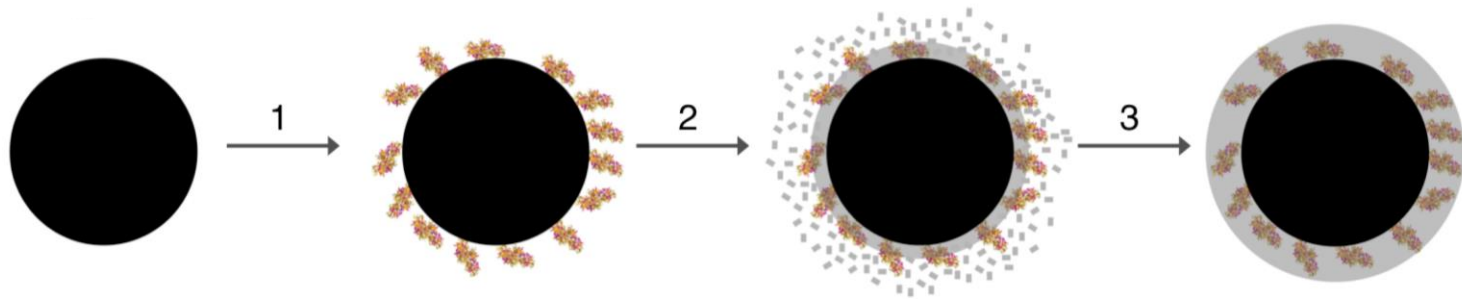


# Signaling a binding event



Successful detection of viruses from water (to be published)  
Enzymes retain their activity even when embedded in the layer

## Enzymes immobilized on surfaces and protected: the enzzen® platform

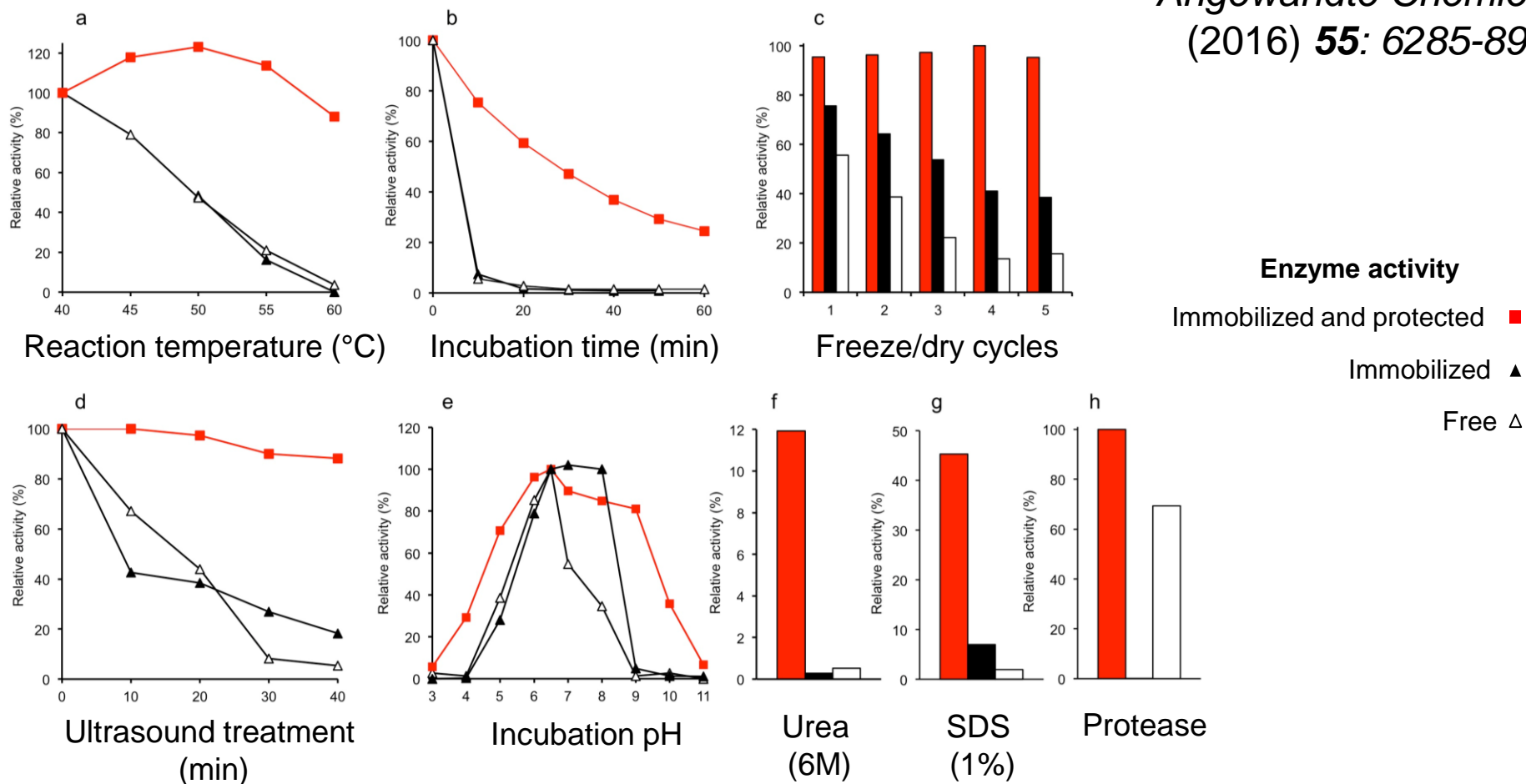


Patent WO2015014888

Enzymes are immobilized on the outer surface of silica particles  
and protected in a nano-size shield while remaining fully active

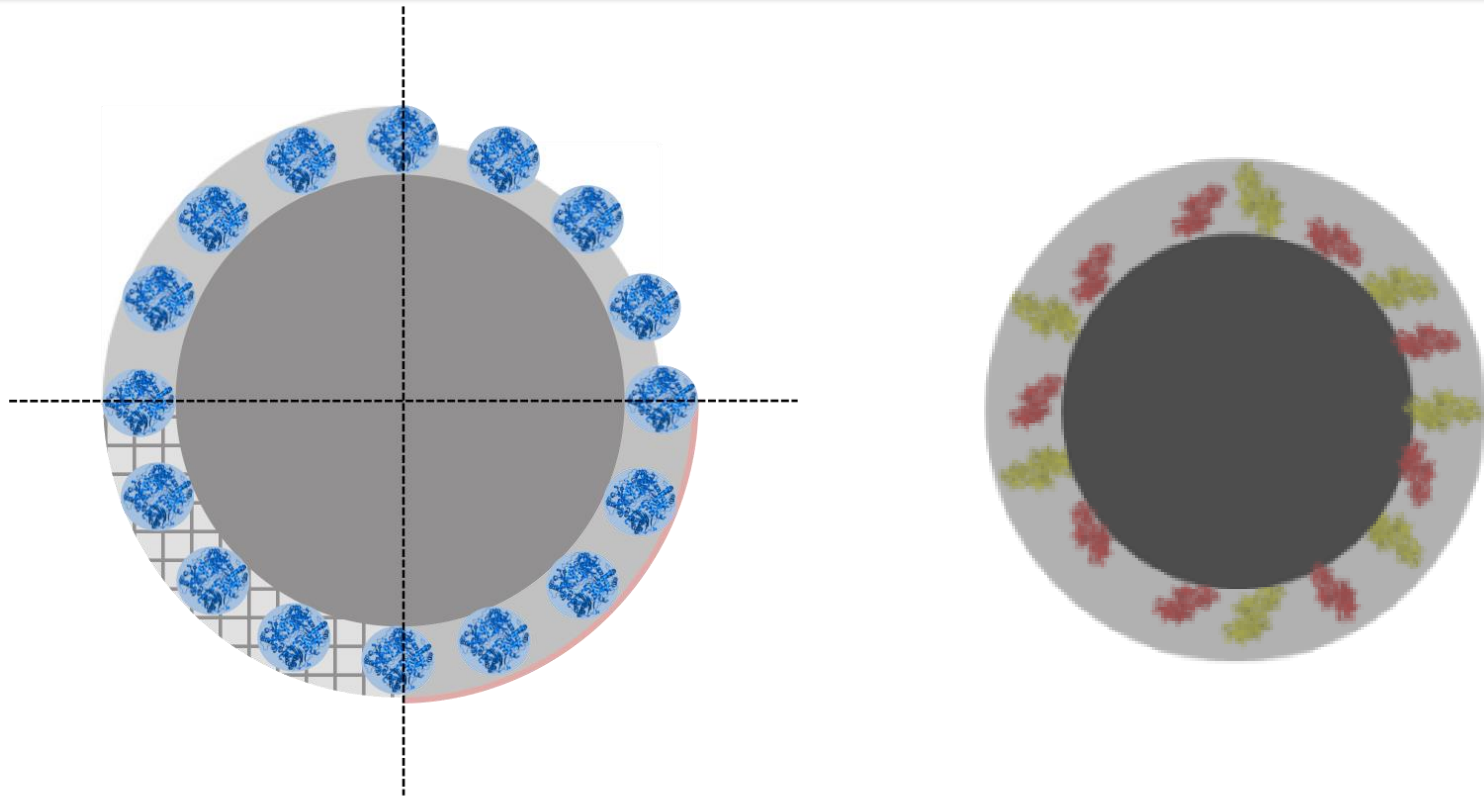
# Enzymes made resistant

*Angewandte Chemie*  
(2016) **55**: 6285-89



The enzyme protection technology provides solid biocatalysts, which are highly resistant to industrial process and *in vivo* conditions





- Tuning the layer thickness, its composition, its porosity
- Co-immobilizing multiple enzymes, along with cofactors

The flexible technology provides a wide variety of enzyme formulations

# Our business

INOFEA

Proprietary  
products

enzzen®-  
formulated  
off-patent  
enzymes

Non-proprietary  
products and  
processes

enzzen-  
inside®

Medical  
textiles

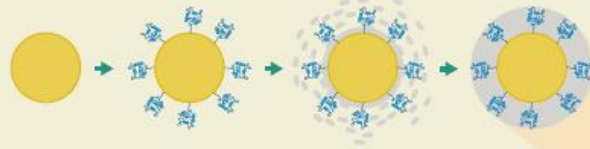
Digestive  
health

e-pure  
building  
blocks

Anti-microbial

Antibody-  
Drug  
Conjugates

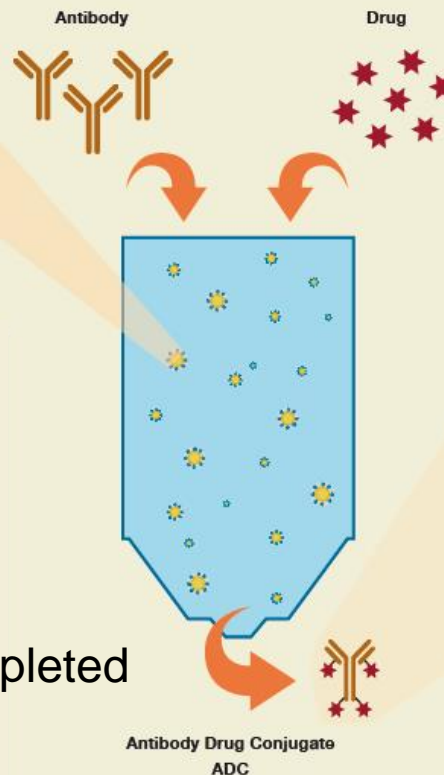
enzzen®  
enabling platform technology



## Industry Problems:

- Very expensive enzymes
- **No enzymes in the final product**
- DSP, purification

Proof of Concept successfully completed  
Scale-up phase engaged  
License agreement

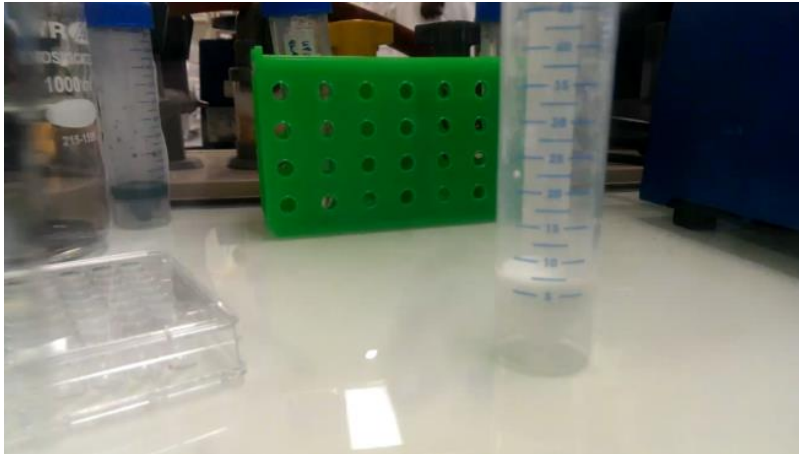


## Our solution:

- Construct optimized for large substrate (Ab)
- Particles retained in a column

## Industry problems

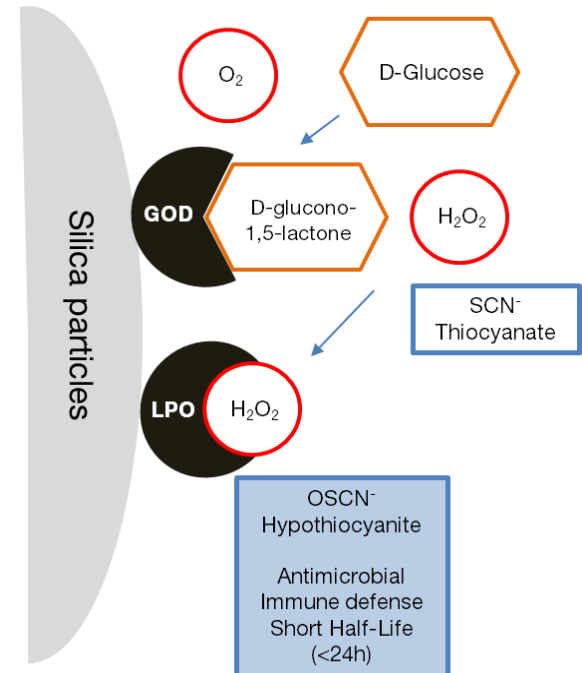
- Aluminium salts banned
- Natural OSCN unstable



- PoC performed in a toothpaste formulation
- Natural system
- Substrate channelling

## Our solution

On site enzymatic synthesis of OSCN



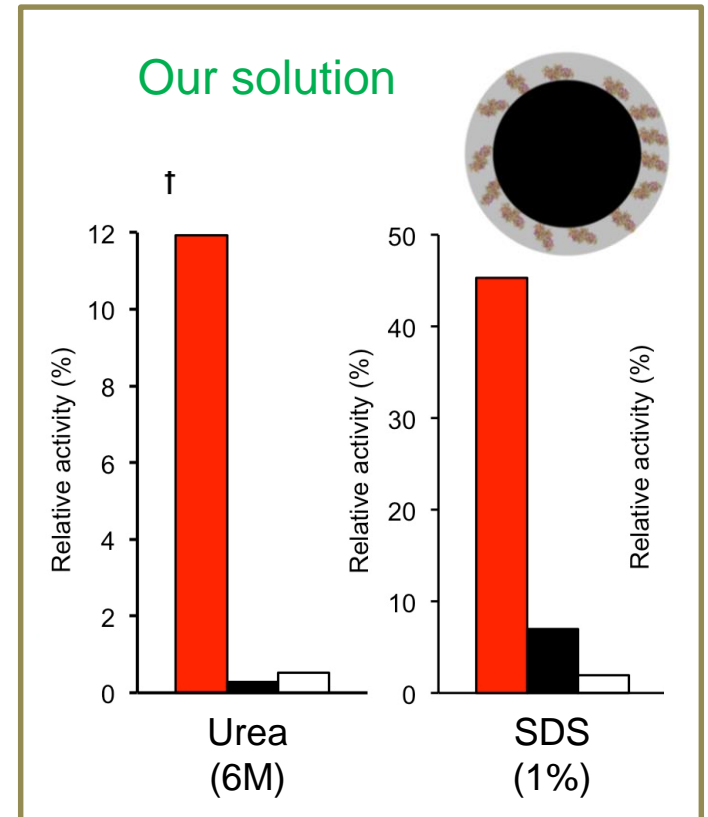
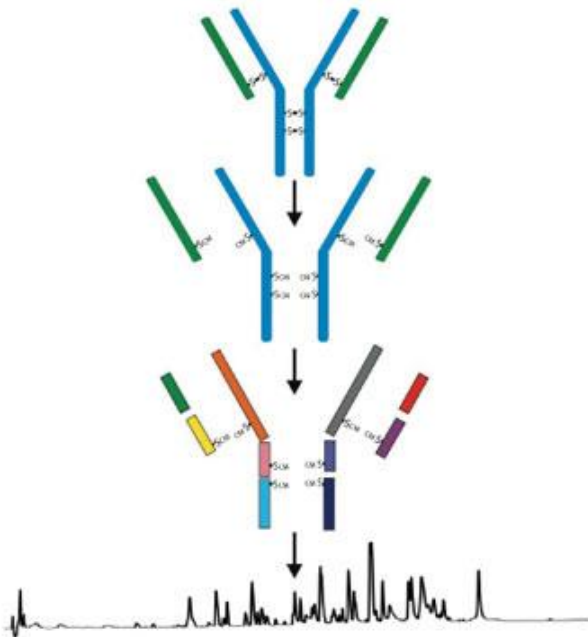


# trypzen®: formulated trypsin



## Industry problems:

- Non-reproducible peptide maps
- Long digestion times
- Non automatised analysis



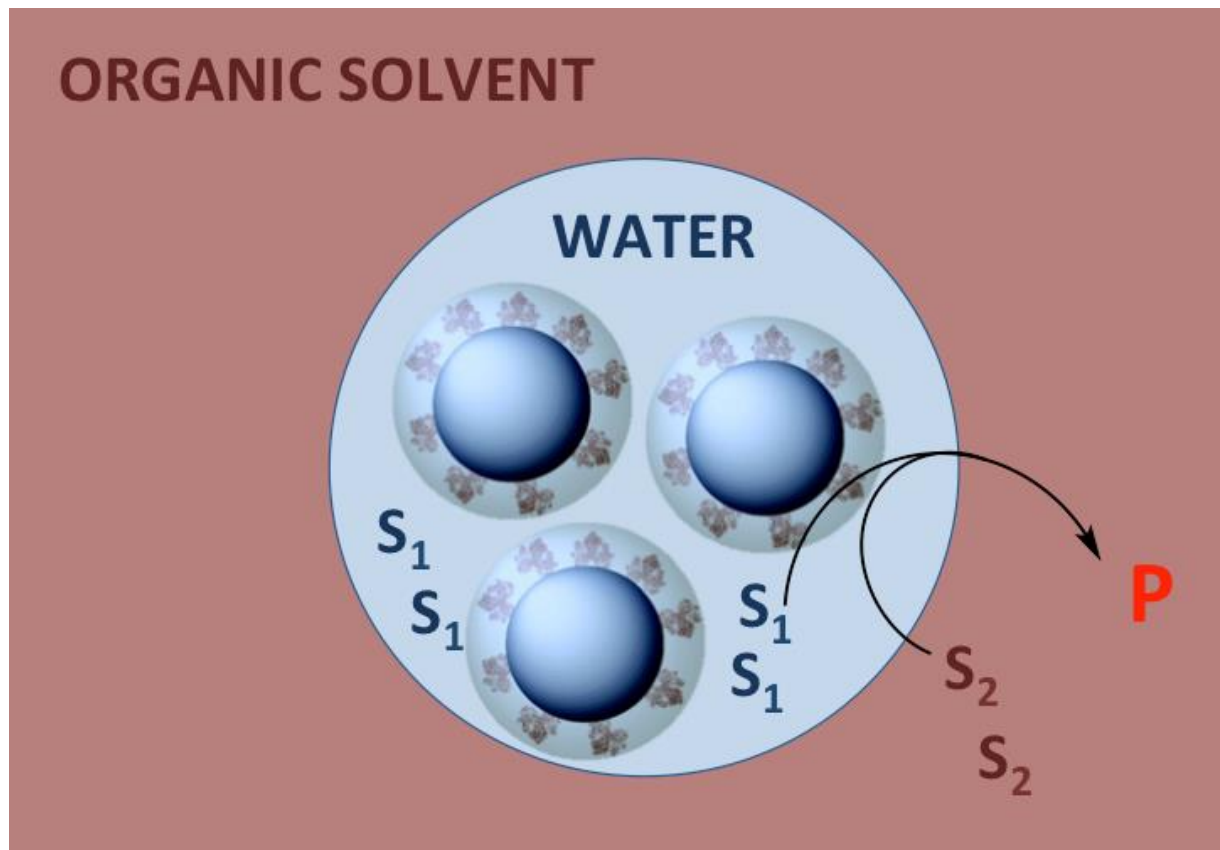
Combining trypsin and chaotropic agent  
for reproducible and automated Ab characterization

## Industry problems:

- Difficulty to combine biocatalysis with organic solvents
- Enzyme instability

## Our solution

- Tuning the layer
- Stability
- 351 times less enzyme required
- recyclable



Tuning the protection layer to achieve biocatalysis in biphasic media

# Our company



- Founded in 2011, labs and offices located in Basel, Switzerland, Spin-off University of Applied Sciences, 4 active persons
- Manufacturing outsourced to CMO
- Seed financing round closed in 2014, raised 50% more than planned. New round on-going.

## ● **Advisory Board**

Dr Hans-Peter Meyer – Former LONZA, Head of Biotechnology

Dr Oreste Ghisalba – Former NOVARTIS, Head of Biocatalysis

Dr Geog Wiebecke – Former ROCHE, Manufacturing site Director

Dr Anne Timm – 27 years experience Pharma & Consumer Health





# INOFEA

empowering enzymes

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CEO

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