

## Tackling AMR with point-of-care devices

wissen2go

**Dr. Giorgia Giovannini**

Scientist, Laboratory of Biomimetic membranes and Textiles

Materials Meet Life, Empa

St. Gallen

[giorgia.giovannini@empa.ch](mailto:giorgia.giovannini@empa.ch)

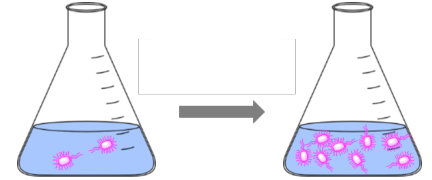
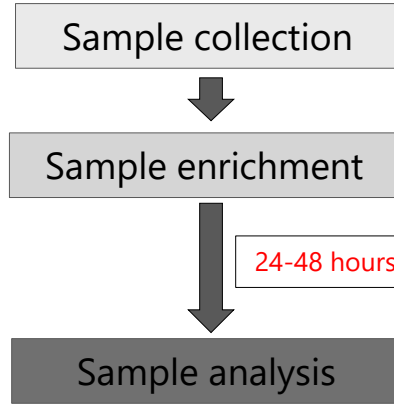
# AMR - diagnosis of the infection



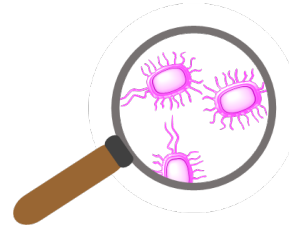
Suspected infection



Current approach



- Cell culture
- PCR



- Direct visualisation
- Selective solid medium
- ELISA test



Medical report  
between **2-5 days**

# AMR - diagnosis of the infection



Suspected  
infection



Common practice

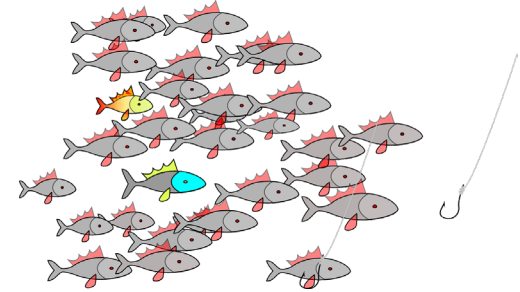
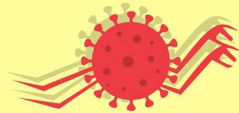
Broad spectrum  
antibiotics



**MISUSE & OVERUSE**  
off-target effects



**AMR**



# AMR – Optical Point-of-care (PoC) tools for the rapid diagnosis of bacterial infections



Design of devices that respond to the WHO's guidance:  
**ASSURE** principle



Prompt administration of the specific antibiotic



Improved antibacterial efficacy limiting AMR  
development

# AMR – Optical PoC tools for the rapid diagnosis of bacterial infections



**A**ffordable



**S**ensitive



**S**elective



**U**ser-friendly

**R**apid and Robust



**E**quipment free:



# AMR – Optical PoC tools for the rapid diagnosis of bacterial infections



**A**ffordable

**S**ensitive

**S**elective

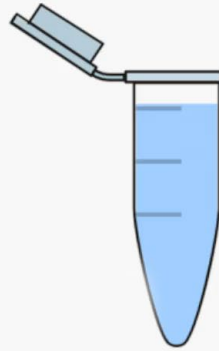
**U**ser-friendly

**R**apid and Robust

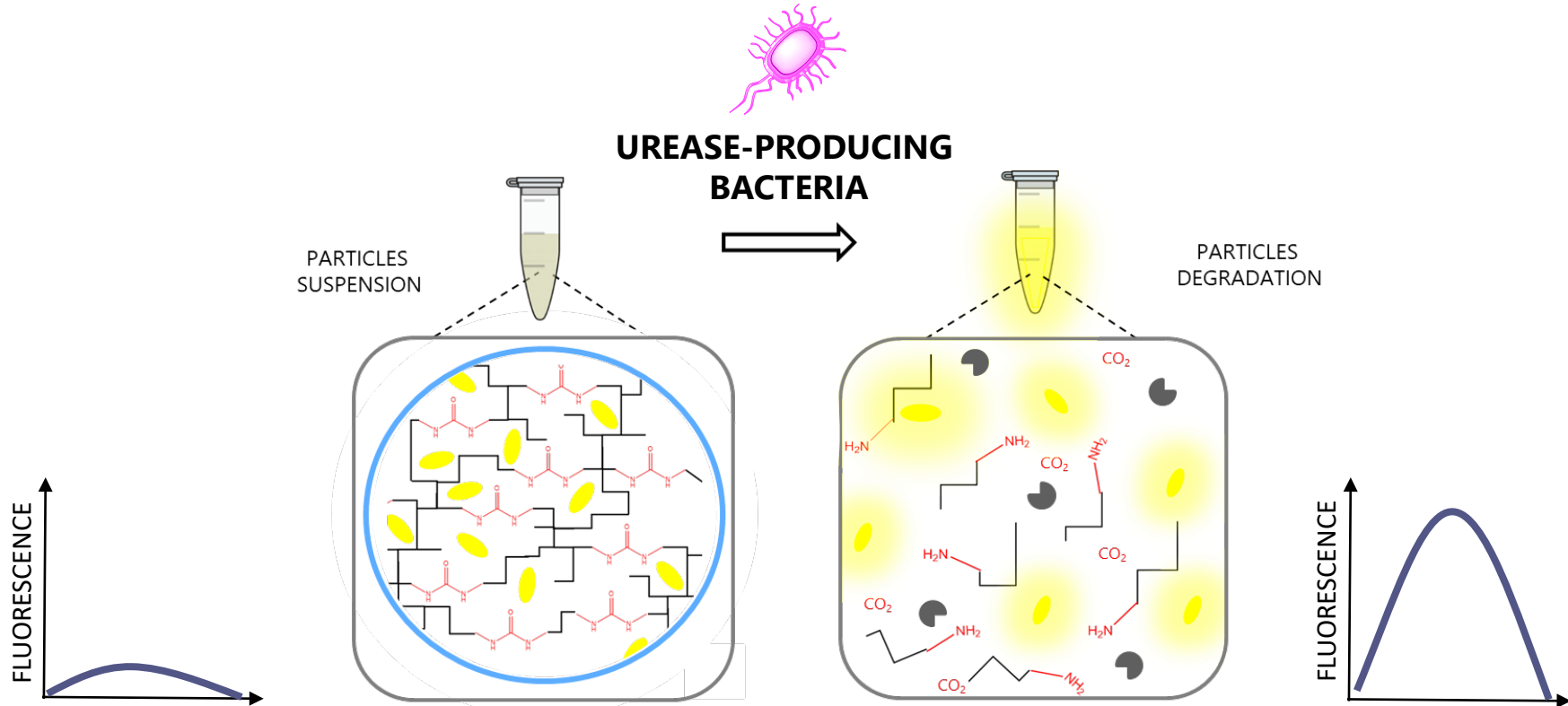
**E**quipment free



# AMR – Optical PoC tools for the rapid diagnosis of bacterial infections



# Example: Fluorescent-based detection of urease-producing bacteria

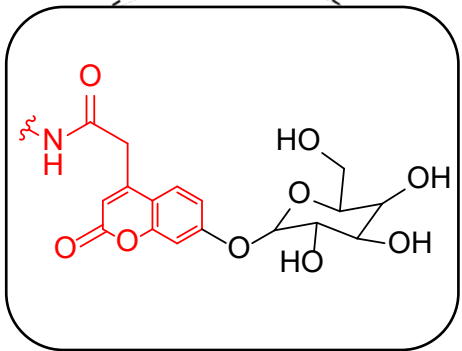
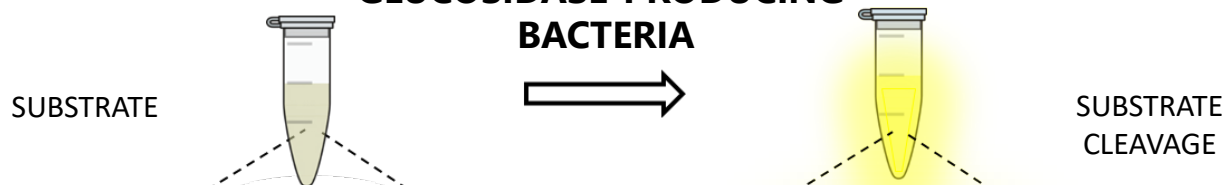




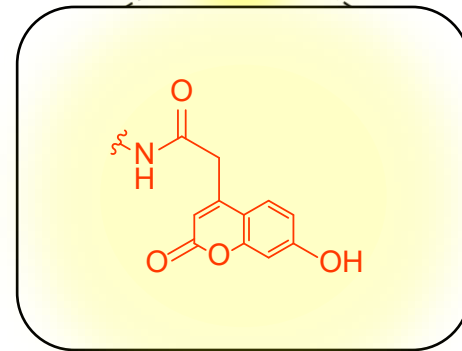
# Example: Fluorescent-based detection of glucosidase-producing bacteria



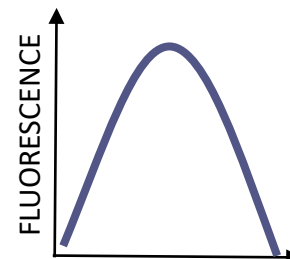
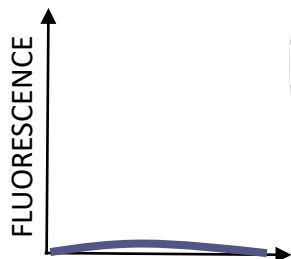
**GLUCOSIDASE-PRODUCING BACTERIA**



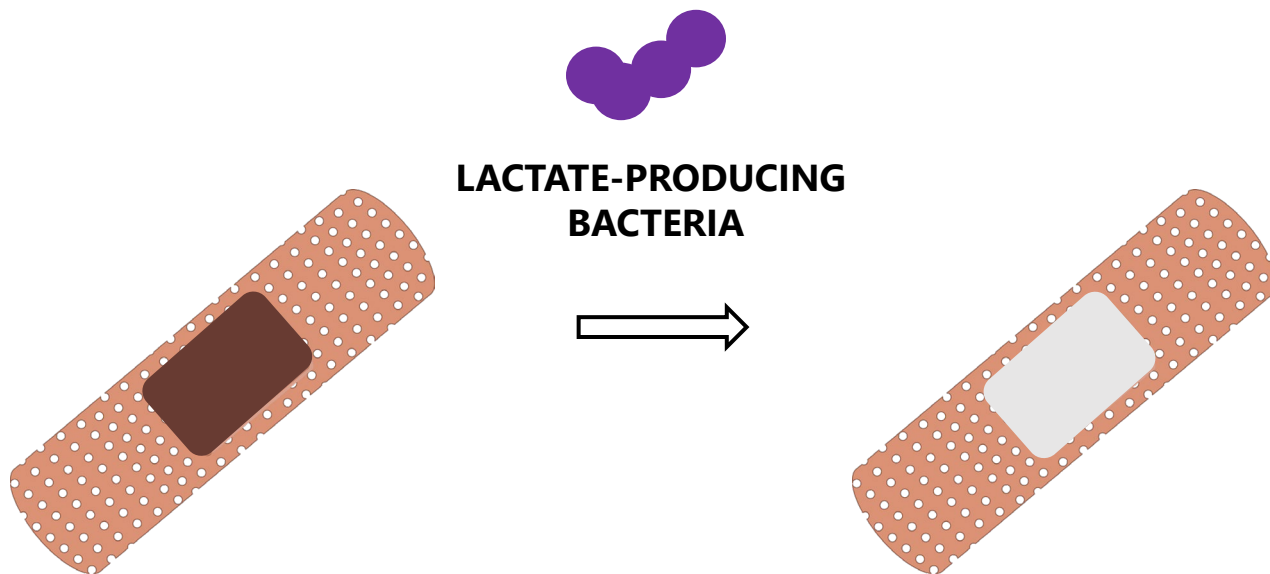
OFF STATE



ON STATE



# Example: Colorimetric-based detection of lactate-producing bacteria



# Future opportunities: bacteria screening



Relatively simple and affordable methods for bacterial screening

	<b>Urease- detection</b>	<b>Glucosidase- detection</b>	<b>Lactate- detection</b>
<i>E. coli</i>	Red	Green	Green
<i>S. aureus</i>	Red	Red	Green
<i>P. aeruginosa</i>	Red	Green	Red
<i>K. pneumoniae</i>	Green	Red	Red

# Take-home message



- The rapid diagnosis of bacterial infection is essential to enable the prompt administration of the specific therapy, limiting the development of AMR
- We are focused on designing PoC devices that, complying with ASSURE principles, enable the robust and cost-efficient discrimination between bacteria
- The affordability, accessibility, and user friendly of the proposed devices will enable a worldwide medicine

# Empa – The Place where Innovation Starts

giorgia.giovannini@empa.ch

Phone +41 58 765 78 03

Address Empa, Lerchenfeldstrasse 5  
CH-9014 St. Gallen

Website [www.biomemtex.com](http://www.biomemtex.com)



Materials Science and Technology

