

Functionalized Microcantilever Sensors for Air Quality Monitoring

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Outline

- Introduction of AMGT
- Our concept for AQM and contact with KET4CP
- Our microgrant project
- Collaboration with the TCs
- Results of the collaboration
- Final thoughts and conclusions

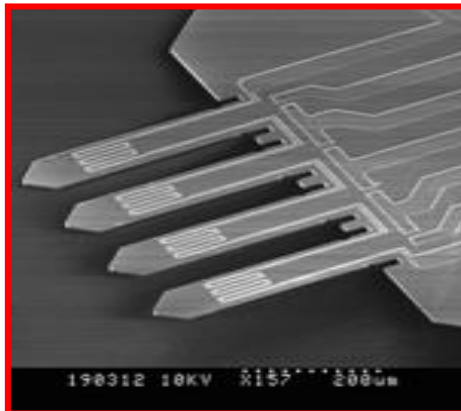
Introduction of AMG Technology Ltd

AMG Technology (AMGT) is a private Bulgarian SME in R&D of MEMS. Some of our self-sensing microdevices demonstrate beyond state-of-the-art performance and allow for creation of novel measuring/monitoring systems and methods. All devices have been developed as prototypes – **technology push** instead of **market pull** is the driving force of our R&D works

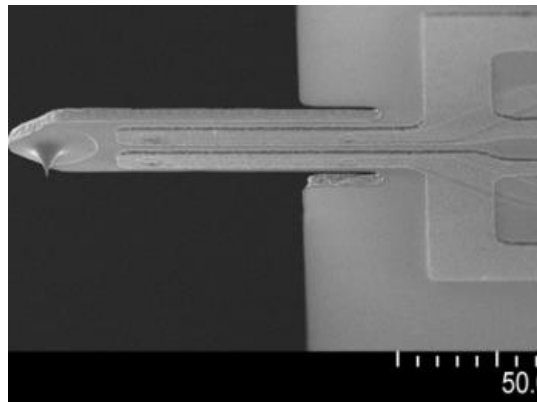


AMGT's Piezoresistive Silicon Microdevices

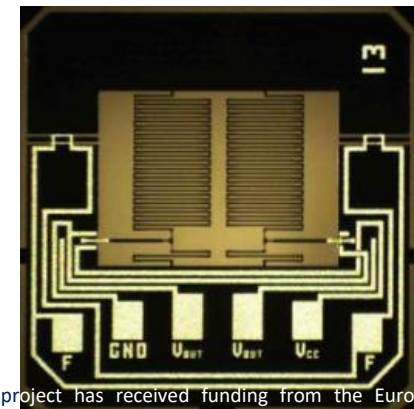
Tipless Cantilevers



AFM Cantilevers

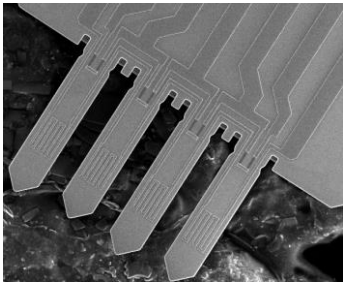


Displacement Sensors



Our Concept for AQM & Contact with KET4CP

*Self-sensing cantilevers are “excellent” signal mixers – they respond to multiple stimuli, and it is really challenging to differentiate them
→ self-sensing cantilevers are not preferred choice for AQM, so far...*



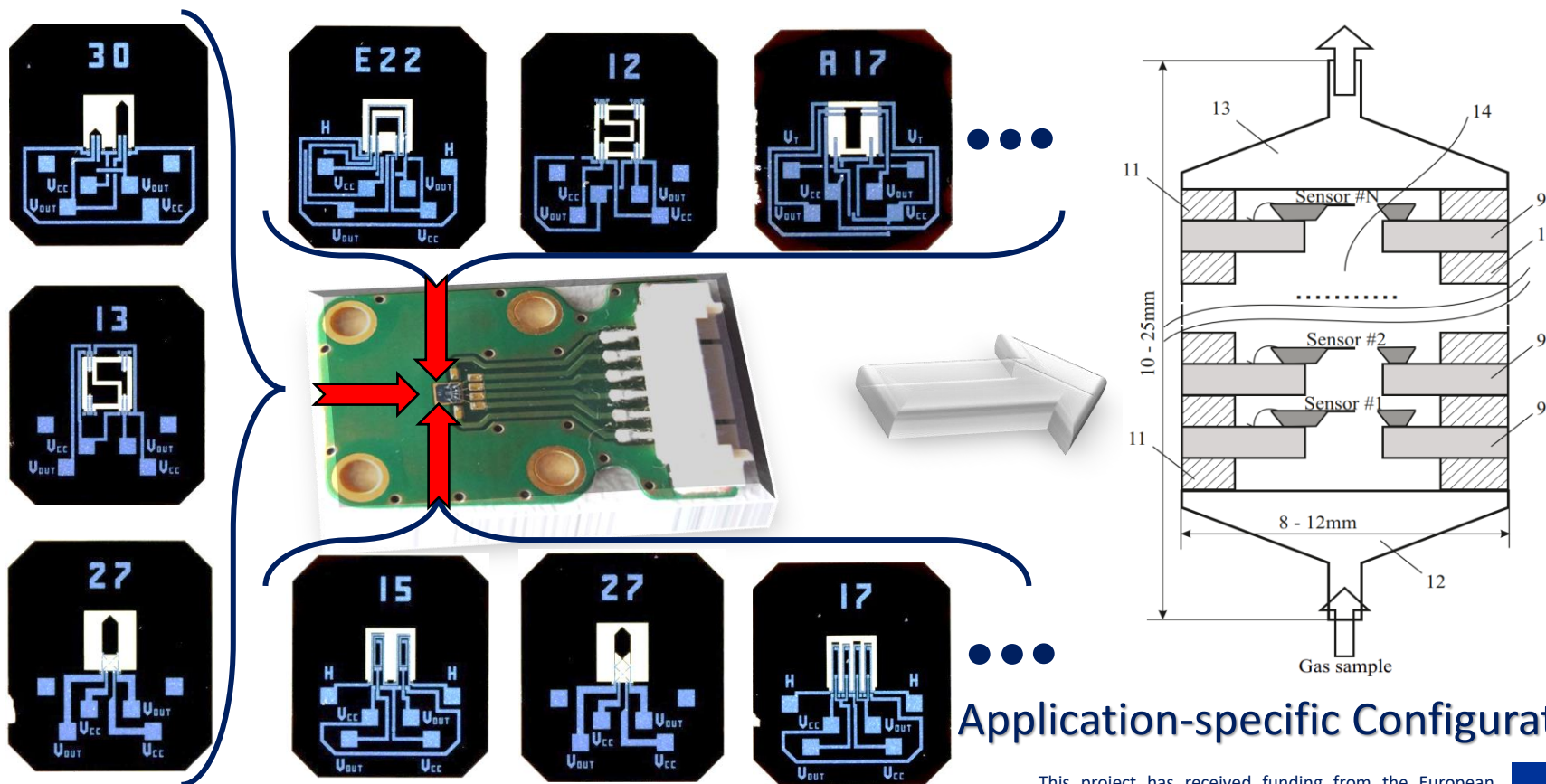
- AQM systems must measure simultaneously multiple physical parameters and chemical composition, preferably at the same point → most systems suffer of low signal coherence and undesirable mutual influence of the measured stimuli → miniature multi-sensing devices are needed;

- Self-sensing cantilevers with varying layout are promising candidate for universal AQM platform, capable to provide simultaneous monitoring of multiple parameters → patent application #BG112997;

- Functional integration and miniaturization are key features of re-configurable AQM modules → *a chain of additional R&D have been just triggered by an internal TTX within the frame of **H-2020 TETRAMAX** project*

Our Concept for AQM & Contact with KET4CP

Is it feasible to monitor AQ with cantilever only sensors?
(Can we convert disadvantages of self-sensing cantilevers in a winning concept?)



Our Microgrant Project



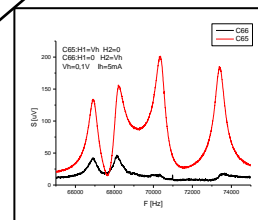
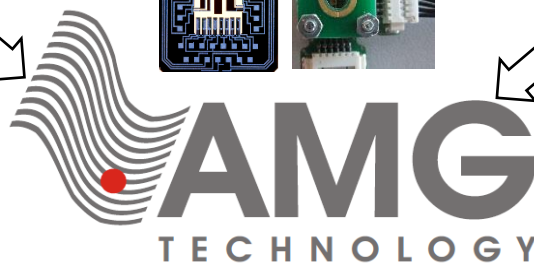
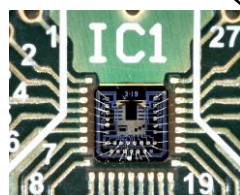
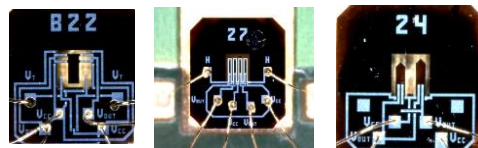
AMGT Participation in
Project TETRAMAX (EU
H-2020, GA № 761349)



Promotional Activities of the
National Coordinator of Project
KET4CP

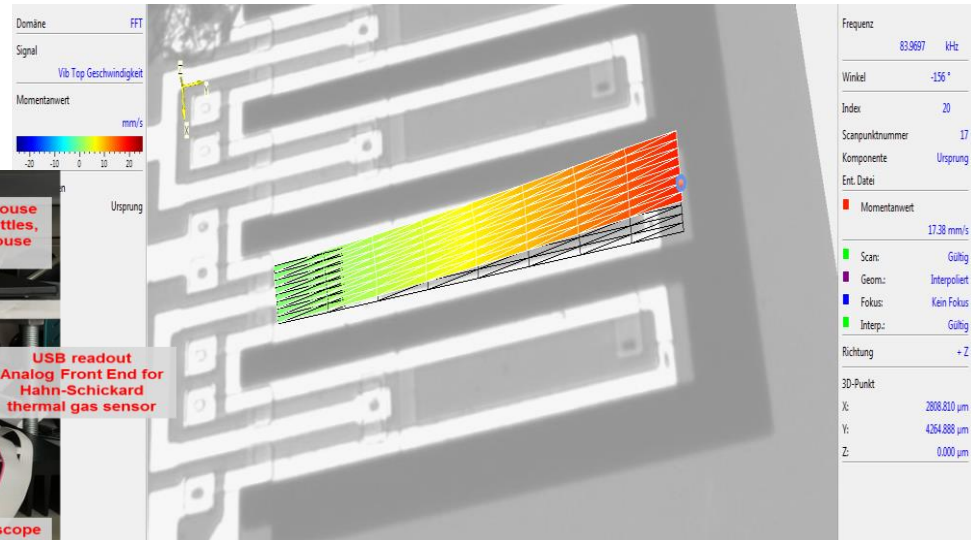
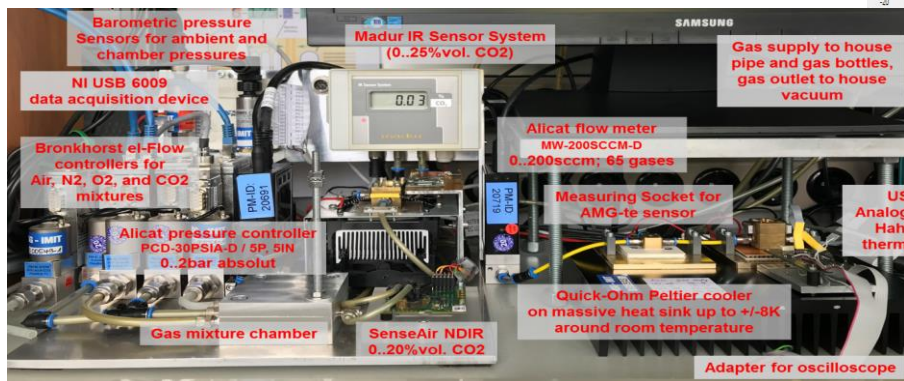
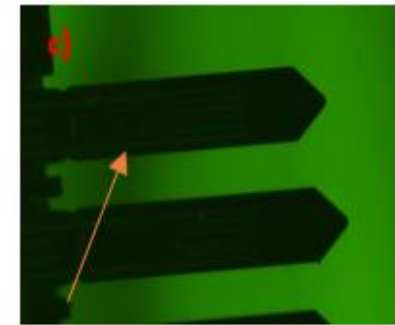
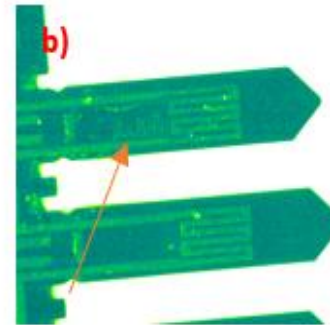
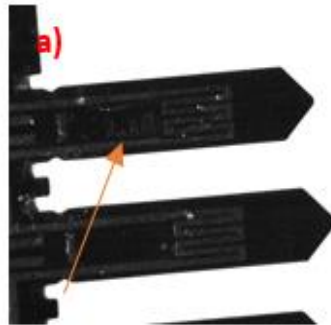


Hahn
Schickard



Partners' expertise → empowering of novel AQM technology

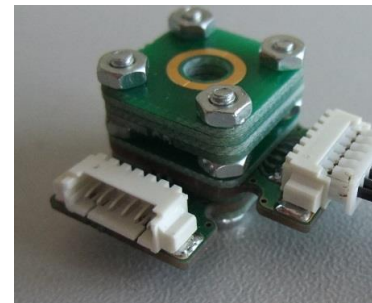
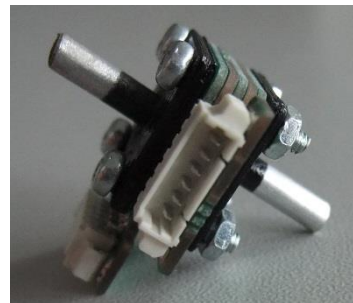
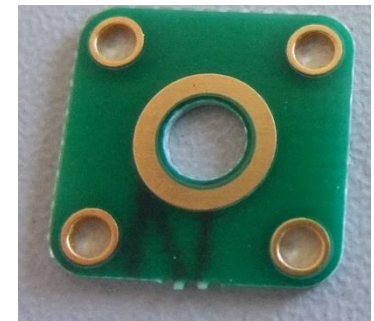
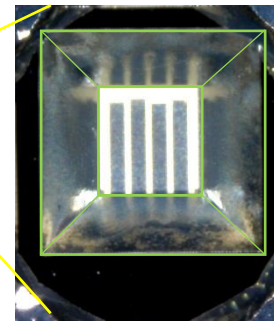
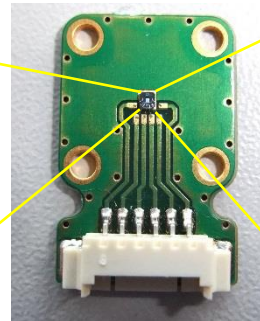
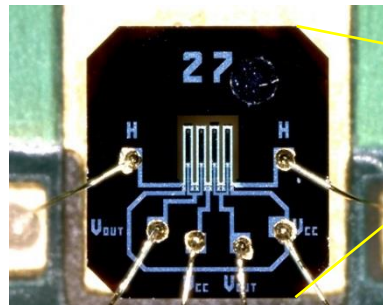
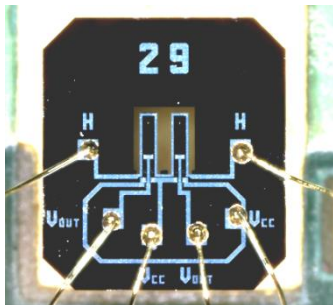
Collaboration with the TCs



All committed works were completed on-time

Results of the Collaboration

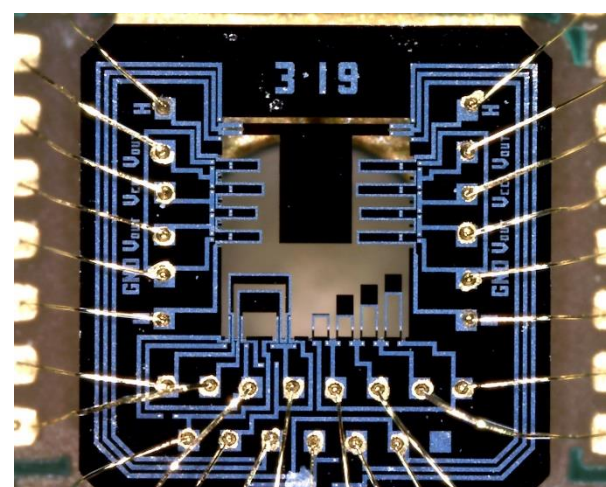
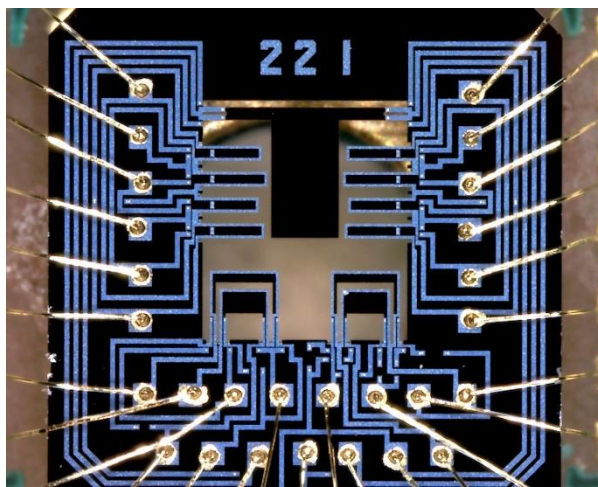
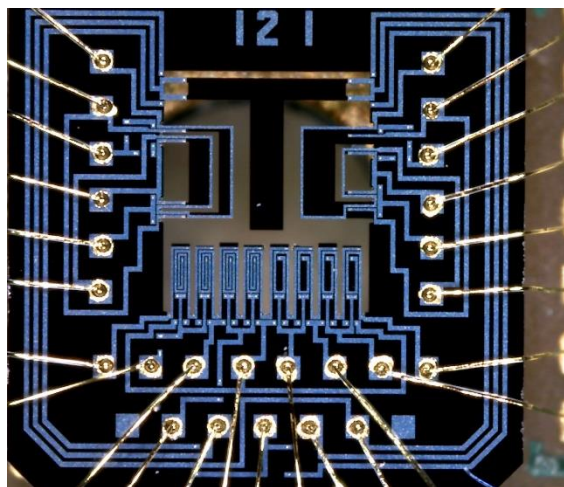
- Cantilever only sensing of different AQ parameters
 - On-board integration of μ -fluidic fitting
 - Reconfigurable application-specific module
- confirmed
 - confirmed
 - confirmed



Results of the Collaboration

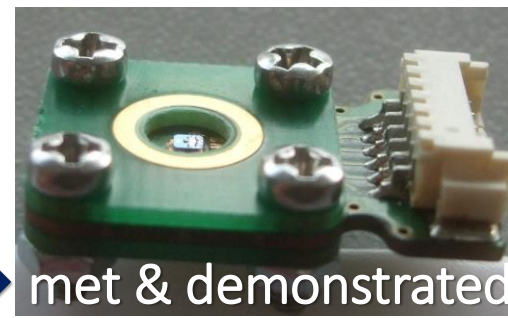
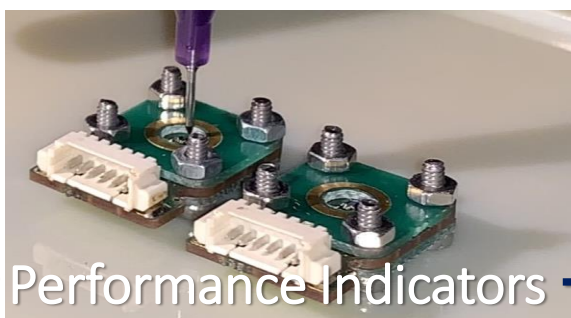
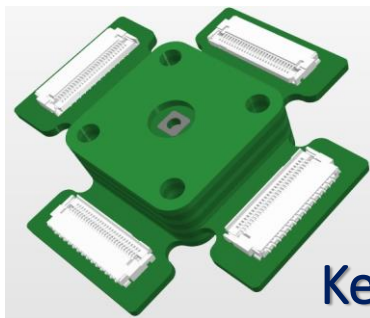
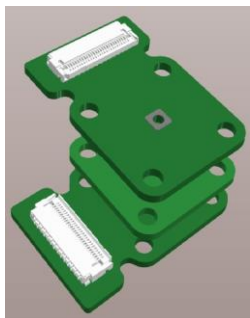
- On-chip integration of multiple AQM sensors

- confirmed



- Concept for post-packaging functionalization

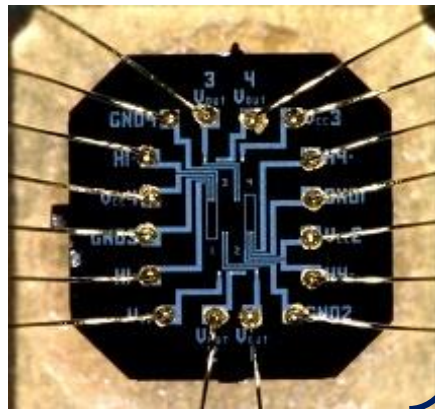
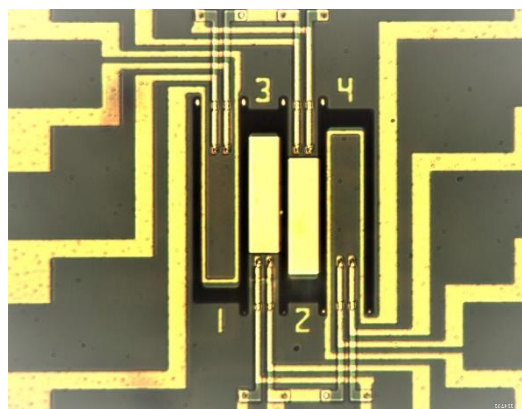
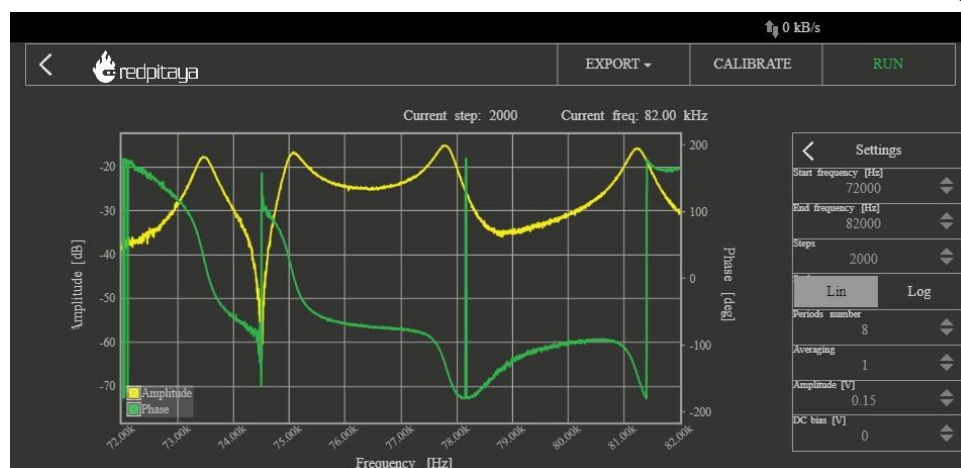
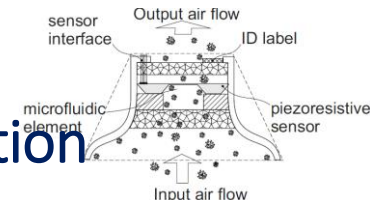
- confirmed



Key Performance Indicators → met & demonstrated

Post-KET4CP Project Results

Cantilever only sensors enable real time pathogen detection
(new project proposal triggered, partners sought)



If/when single pathogen sensors available

Pathogens can be detected in real time before symptoms onset

Effective tool for handling of any future pandemic will be enabled

Final Thoughts and Conclusions

- Microgrant projects are very effective tool for acceleration the collaborations *between different in size and expertise* entities;
- Project duration of less than 9 - 12 months is rather short time, if partners have no pre-project collaboration;
- Funding options of “unconventional” approaches, like our concept, are very limited → specifically designed funding is simultaneously: necessary & viable, in order to support off-mainstream innovations

THANKS FOR THE SUPPORT IN KET4CP AND FOR YOUR ATTENTION!