



**Institute for Environmental Protection and
Sensors, Production, Trade and Services, Ltd.**

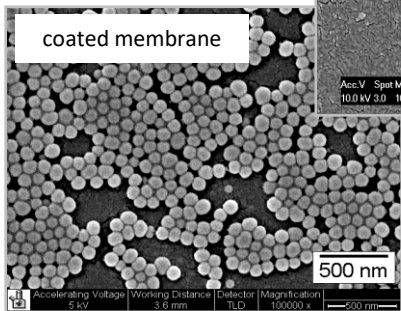
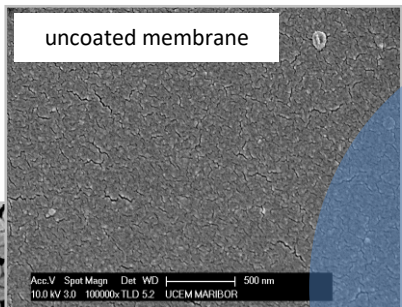
Maribor, Slovenia

Prof.dr. Aleksandra Lobnik

Ljubljana, 23/05/2024

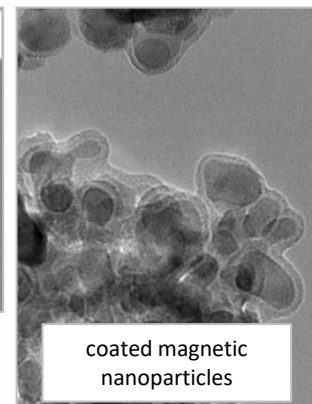
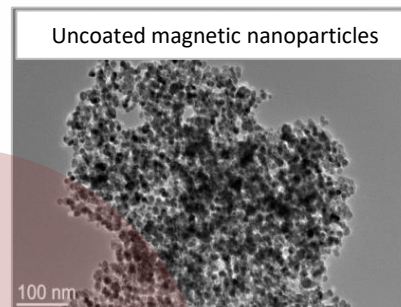


IOS, Institute of Environmental Protection and Sensors, Ltd



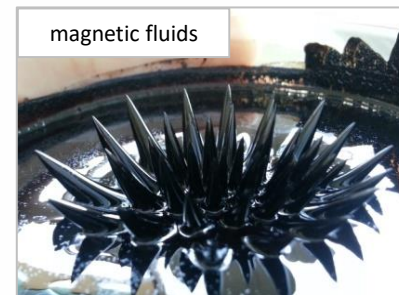
WATER, WASTES
RECYCLING
PROCESSES

PATENT: NM “20 patent applications” 10 EU and 2 USA
KOŠAK Aljoša, BAUMAN Maja, LOBNIK Aleksandra “A method of surface treatment of thin film composite (TFC) membranes with tetraalkoxysilanes for retention of heavy metal ions in the membrane filtration processes of waste waters”, Patent No. SI 23535 A, 2012, The Slovenian Intellectual Property Office, Ljubljana



OPTICAL
CHEMICAL,
BIO- SENSORS

NANOTECHNOLOGY
& NANOMATERIALS

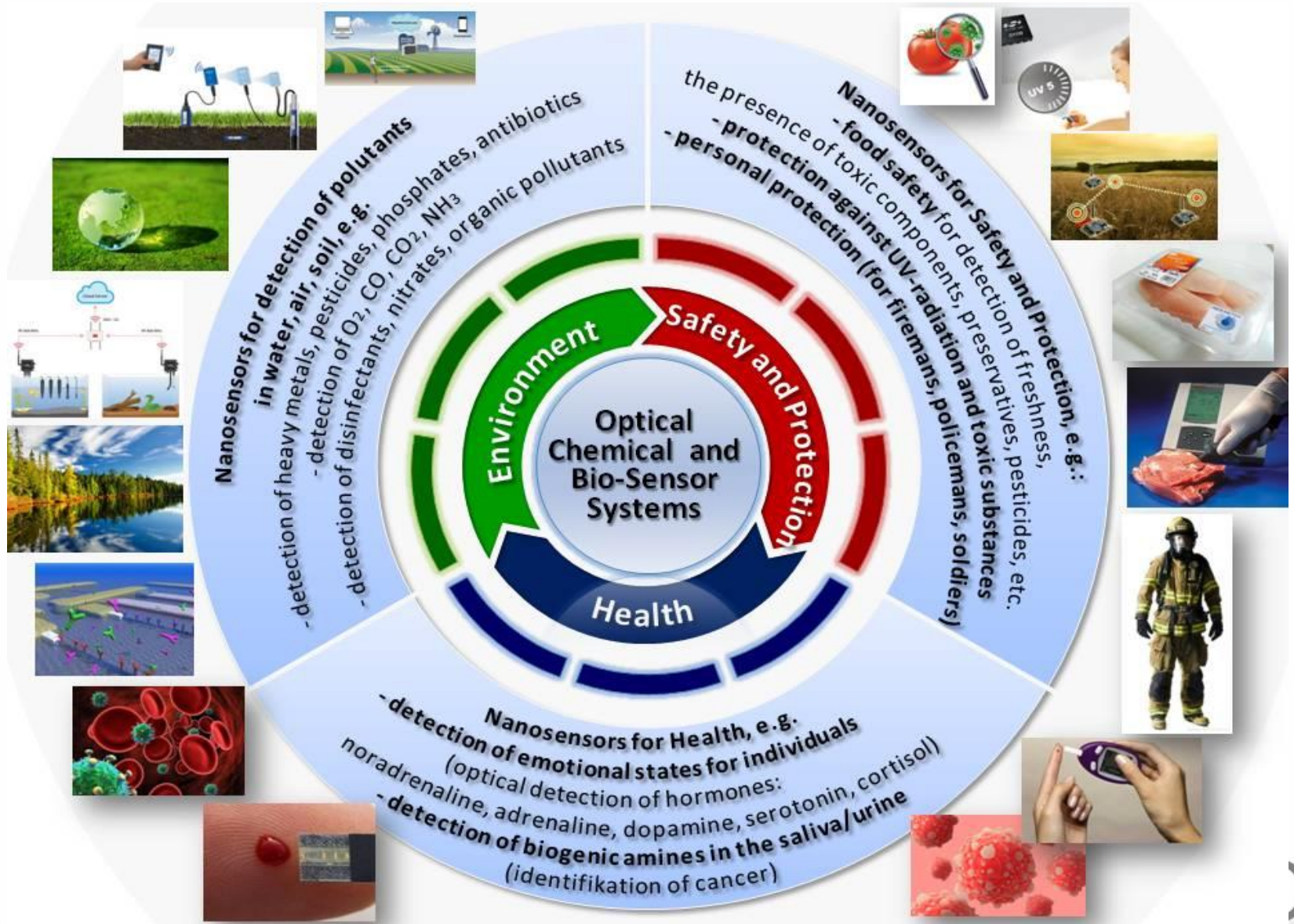


PATENT:
LOBNIK Aleksandra,
KORENT UREK Špela.
“A method and an optical
chemical sensor with a sol-gel
membrane for the detection of
organophosphates”,
EP 2 678 673 (B1), 2016-06-08.
Berlin, Germany: European
Patent Office, 2016.

PATENT:
LOBNIK, Aleksandra “Sol-gel based optical chemical sensor for detection of organophosphates and method for preparation thereof”:
RU2013129043 (A), 2015-01-10; RS55040 (B1), 2016-12-30;
RS55040 (B1), 2016-12-30. Beograd. USA patent under consideration.

PATENT:
KOŠAK Aljoša, LAKIĆ Marijana, LOBNIK Aleksandra, “Process for the preparation of superparamagnetic hollow spherical nanostructures”
GB2526659 (A), 2015-12-02. London: Intellectual property office, 2015.

Sensor Applications



Key Work Areas

Sensor Department

Food Industry

- Sens4FoodQ
- FreshSens
- MeatQ



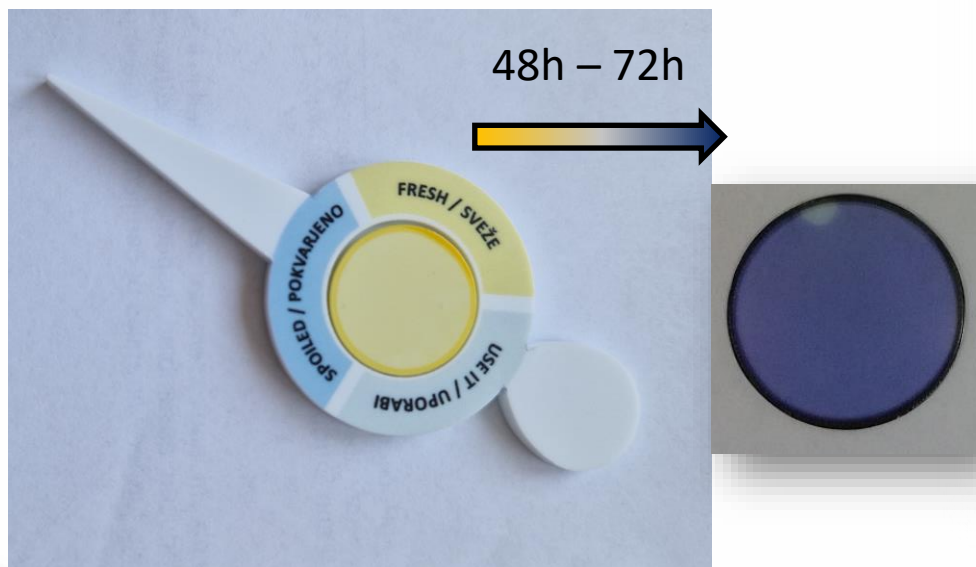
Defence Industry

- GasSense



FreshSens

- Sensor system for detecting the freshness of poultry meat
- Simple monitoring of meat quality
- “Reverse” feature
- Food contact certificate



Poročilo o izvedeni nalogi

Preiskave materialov, namenjenih stiku z živili

Evidenčna oznaka: 2500-19/61084-22/121060

Naročnik: IOS, INŠTITUT ZA OKOLJEVARSTVO IN SENZORJE, PROIZVODNJA, TRGOVINA
IN STORITVE, D.O.O.
BELORUSKA ULICA 7
2000 MARIBOR

Naročilo: PO-2500-19/61084-22/78345, z dne 22.09.2022

Izvajalci: Oddelek za varnost izdelkov za potrošnike
Oddelek za kemijske analize živil, vod in drugih vzorcev okolja Maribor
Oddelek za kemijske analize živil, vod in drugih vzorcev okolja Novo mesto

Vodja naloge: Lucija Smojver, univ. dipl. inž. kem. tehnol.

Skrbnik vzorca: Mateja Grušovnik, mag.inž.kem.teh.

Maribor, 04.01.2023

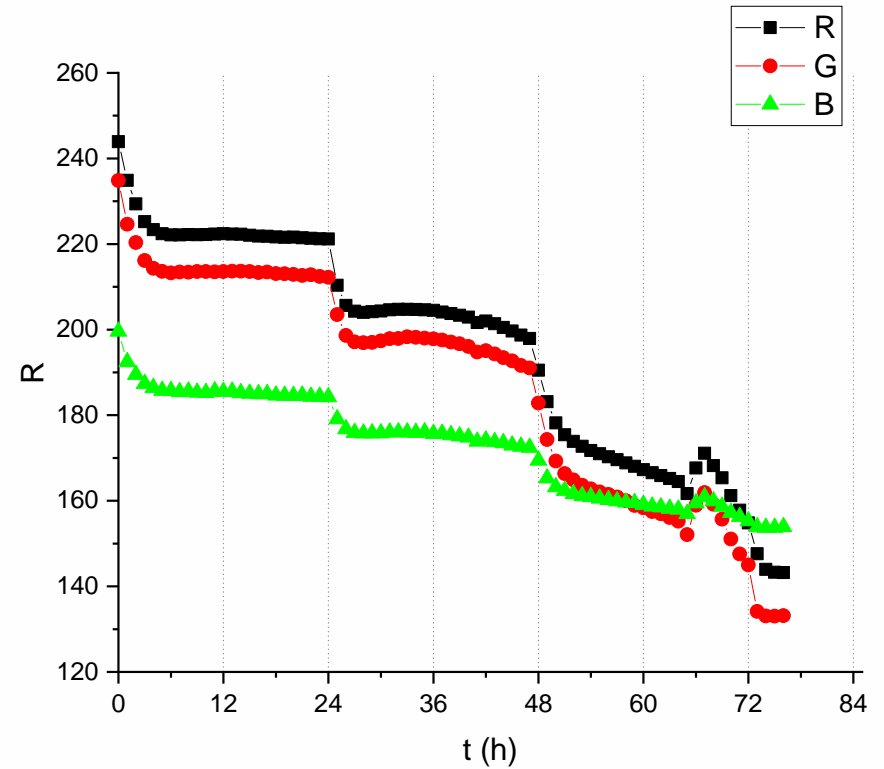
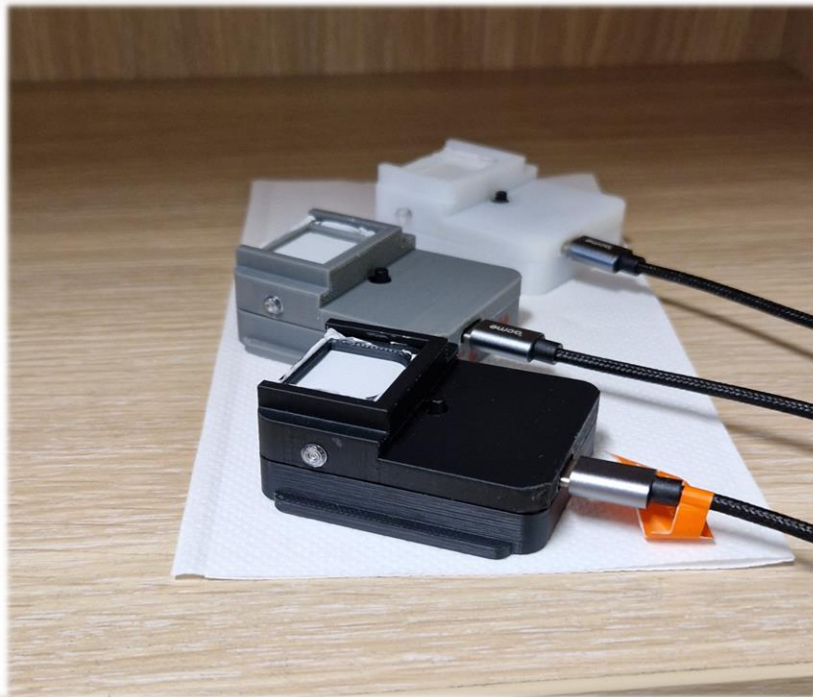
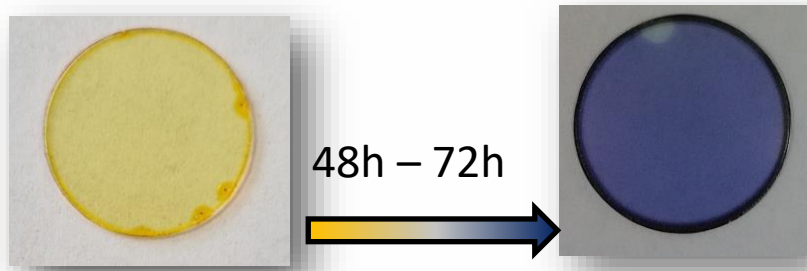
Oddelek za varnost izdelkov za potrošnike
Vodja naloge:

Lucija Smojver, univ. dipl. inž. kem. tehnol.

Čas certificiranja podpisa in podatki o certifikatu so razvidni na vrhu prve strani dokumenta.

Sens4FoodQ

➤ RGB detection method



MeatQ

- Smart package system for poultry freshness detection
- Colour indication of meat quality
- Food contact certificate



Gold regional award for innovation in 2022



Bronze national award for innovation in 2022



PESCO Projekt CBRN SaaS in EU EDA projekt RSS projekt

Vključujeta podjetja in Ministrstva za obrambo iz Avstrije, Hrvaške, Madžarske, Slovenije, Francije

PESCO CBRN SaaS/EDA RSS

Main goal: Recognized CBRN picture

CBRN Reconnaissance and Surveillance System (RSS)

Hazard area

Unmanned system modules



Interchangeable



Sensor & sampling modules

C
B
R
N

D
I
M

Safe zone

Deployment from control elements



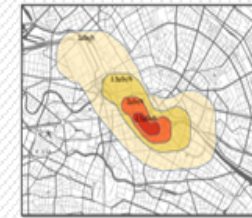
Operational mission planning & execution

Up to 50km



Data fusion cell

Mission planning & execution



CBRN decision making

Interface to Command & Control Systems



Flexibility

Modularity

Homogeneity

Interoperability

Systemic dimensions for transnational EU operations

Projekt z Ministrstvom za obrambo

DRONE
with CRN capabilities

multirotor aircraft platform

chemical and radiological sensors

military and civil applications

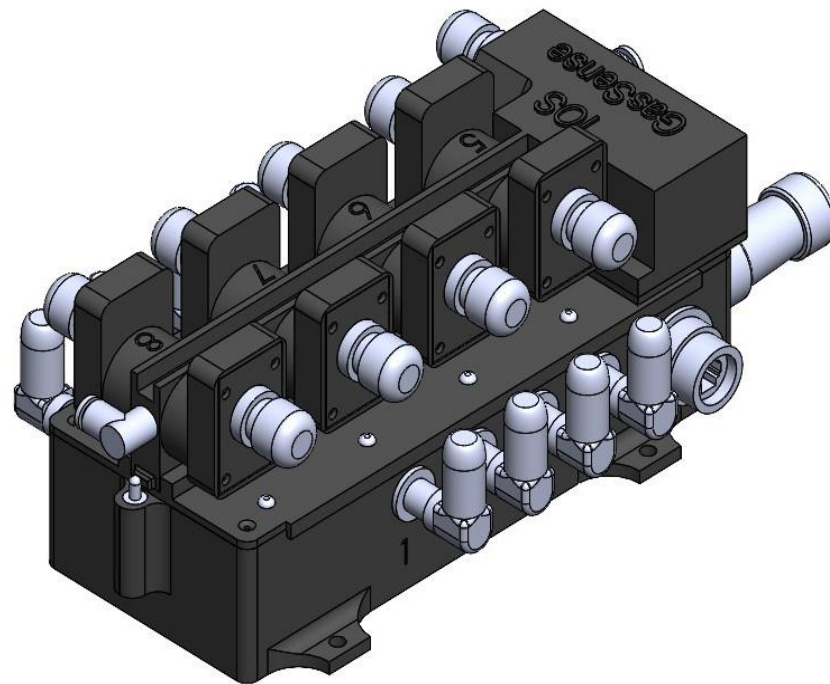
extended range with translational drone



CONSORTIUM OF SLOVENIAN COMPANIES

IOS onedrone C-ASTRAL ARCTUR MIL SISTEMIKA

GasSENSE





VKLJUČENI SENZORJI/ NABOR VKLJUČUJE 25 različnih senzorjev

Formaldehyde	0 – 100 ppm	Electrochemical
VOC	0 – 10000 ppm	Electrochemical
HCl	0 – 30 ppm	Electrochemical
HCN	0 – 50 ppm	Electrochemical
HF	0 – 10 ppm	Electrochemical
NH ₃	0 – 1000 ppm	Electrochemical
Acid(H ₂ SO ₄ /HNO ₃)	from (25ppm) (15mg/m ³)	Electrochemical
Phopshine	0 -100 ppm	Electrochemical
Organophosphate	0 – 1 ppm	Optical chemical

Main Achievements

Analyte	Test Reference	Measured concentration GC-MS [$\mu\text{g}\cdot\text{m}^{-3}$]	Sensor response	
			OCS-OP (IOS)	
Sarin (GB)	Test_GB_1	< 10	Detected	✓
	Test_GB_2	< 10	Detected	✓
	Test_GB_3	76,52	Detected	✓
	Test_GB_4	229,23	Detected	✓
	Test_GB_5	118,78	Detected	✓
Soman (GD)	Test_GD_1	19,66	Detected	✓
	Test_GD_2	44,8	Detected	✓
	Test_GD_3	51,8	Detected	✓
	Test_GD_4	73,13	Detected	✓
	Test_GD_5	139,21	Detected	✓
RVX	Test_RVX_1	<100	Detected	✓
VX	Test_VX_1	43,99	Detected	✓

REPORT DOCUMENTATION PAGE		
1. REPORT TYPE Test report	2. REPORT DATE July 4th 2023	3. DATES COVERED June 26th – June 29th 2023
4. TITLE AND SUBTITLE Testing of IOS detection devices		5. CONTRACT NUMBER 302321/020
6. AUTHOR (s): Kamila Vymazalová VVÚ s.p., Brno Martin Štěpán VVÚ s.p., Brno Petr Zavadilík VVÚ s.p., Brno Aleksandra Lobnik IOS d.o.o. Luka Popović IOS d.o.o.		8. PERFORMING ORGANIZATION REPORT NUMBER
7. PERFORMING ORGANIZATION NAME AND ADDRESS VVÚ s.p., Veslařská 230, 637 00 Brno, Czech Republic, Tel.: +420 532 191 323		9. DISTRIBUTION/AVAILABILITY STATEMENT The results written in this report are IOS and VVÚ s.p., Brno property.
9. DISTRIBUTION/AVAILABILITY STATEMENT		10. NUMBER OF PAGES 9
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13. PERIOD OF VALIDITY		
14. SIGNATURE Ing. Kamila Vymazalová, Ph.D. DATE: July 4th 2023 PLACE: Brno, Czech Republic		15. STAMP   Vojenský výzkumný ústav, s.p. Veslařská 230, 637 00 Brno diČ: C29972259, iČ: 29372259

Reference	Test name	Characteristics under test	Acceptance criteria	Result
1	ECS-HCN sensor test	Reaction to HCN gas. Applied gas concentrations are: 15ppm; 30ppm	Measured value within +/- 20%	✓
1.1	ECS-HCN sensor test	Response time, time taken from reaching half of the peak concentration (T50)	Less than 90 sec.	✓
2	ECS-HF sensor test	Reaction to HF gas. Applied gas concentrations are: 5ppm; 10ppm	Measured value within +/- 20%	✓
2.1	ECS-HF sensor test	Response time, time taken from reaching half of the peak concentration (T50)	Less than 90 sec.	✓
3	ECS-HCl sensor test	Reaction to HCl gas. Applied gas concentrations are: 10ppm; 20ppm	Measured value within +/- 20%%	✓
3.1	ECS-HCl sensor test	Response time, time taken from reaching half of the peak concentration (T50)	Less than 90 sec.	✓
4	ECS-PH3 sensor test	Reaction to PH3 gas. Applied gas concentrations are: 25ppm; 50ppm	Measured value within +/- 20%%	✓
4.1	ECS-PH3 sensor test	Response time, time taken from reaching half of the peak concentration (T50)	Less than 90 sec.	✓
5	ECS-CH2O sensor test	Reaction to CH2O gas. Applied gas concentrations are: 20ppm; 50ppm; 90ppm	Measured value within +/- 20%	✓
5.1	ECS-CH2O sensor test	Response time, time taken from reaching half of the peak concentration (T50)	Less than 90 sec.	✓
6	ECS-NH3 sensor test	Reaction to NH3 gas. Applied gas concentrations are: 300ppm; 800ppm	Measured value within +/- 20%	✓
6.1	ECS-NH3 sensor test	Response time, time taken from reaching half of the peak concentration (T50)	Less than 90 sec.	✓

EU EIC projekt OpenLOOP 2023-2025

TRL 6-9

Optimizacija in Scale up procesi za razgradnjo ***tekstilnih odpadkov*** celuloze in PET.

Vključujemo lahko tudi plastične PET odpadke in odpadno kartonsko embalažo

DEMO PILOTNA NAPRAVA Maribor

IOS, Ltd 30t/letno





Institute for Environmental
Protection and Sensors



NANOAPP 2024

Nanomaterials & Application
18 – 21 June 2024, Ptuj, Slovenia



The logo for IOS, featuring a green square with a white diagonal line and a red curved line below it, followed by the letters 'IOS' in a bold, sans-serif font.

Hvala za vašo
pozornost in

vljudno vabljeni na

NANOAPP 2024