

**IEEE P2520.2.1**  
**Machine Olfaction Devices and Systems used for General Outdoor Odor Monitoring**  
(SEN/SC/TMODS/OOM/2520.2.1)

Working Group Meeting #18 Minutes  
13 February 2023 / 10:00 AM – 11:00 AM (ET)  
WG Chair: Ehsan Danesh  
WG Secretary: Troy Nagle (substituting)

**1. Call to Order**

The Chair called the meeting to order at 10:03 AM ET. The Chair also announced that the meeting was being recorded for the purpose of preparing minutes.

**2. Roll Call and Disclosure of Affiliation**

*Affiliation FAQs:* <http://standards.ieee.org/faqs/affiliation.html>

The Chair directed participants to a Google Docs link in the Chat window:

[https://docs.google.com/spreadsheets/d/1ydvTFKxRSYRrpT1CX-22zaNkETV4\\_aqD2NDVSoxxfk8/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1ydvTFKxRSYRrpT1CX-22zaNkETV4_aqD2NDVSoxxfk8/edit?usp=sharing)

Participants were asked to register for the meeting by placing an X at the intersection between the row including their name and the column including the meeting date. First-time participants and individuals whose information was not already listed within the Google document were instructed to include their name, affiliation and status under the appropriate columns at the bottom of the Google form. The Chair advised participants that member status is contingent upon provision of all required information, any missing information having been highlighted (yellow) in the Google document for participant's convenience. Participants were also asked to include their affiliations in parentheses after their name in the Chat window, if using the chat area. A few minutes were allowed for participants to access and complete the sign-in process. The Chair added the attendance status of participants who did not complete their attendance status directly.

At least two (2) of the most recent four (4) WG meetings must be attended in order to maintain voting rights.

The participant information from the online participants list and from the Google participant registration document has been merged and may be found in **Attachment A**.

**3. Approval of Agenda and Previous Meeting Minutes**

The Chair displayed the announced agenda. Nineteen of the 28 voting members were attending. Since a quorum of 15 was met, the Chair called for a motion to approve the

Agenda and Minutes as circulated of the last two Working Group Meetings on November 14 and December 12. Susan Schiffman made the motion; James Covington seconded. The motion passed without objection to unanimous consent.

#### 4. IEEE Patent & Copyright Policies

##### a. Call for Patents

<https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf>

Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding potentially essential patents. No one raised concerns for consideration.

##### b. Copyright Policy

<https://standards.ieee.org/ipr/copyright-materials.html>

Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding copyrights. There were no questions or concerns.

#### 5. Technical Presentation(s) and Discussion

The Chair introduced the presenter for the February 13<sup>th</sup> 2023 WG Meeting: Stéphane Cariou (IMT Mines Alès, France), “Odor-Chemistry Relationship.”

##### a. *Presentation by Stéphane Cariou*

In the presentation, Stéphane explained his research in finding the relationship between sensory attributes (persistence, acceptability, quality, and intensity) and physiochemical properties (nature, concentration, and organoleptic characteristics). His approach to identifying molecules ( $V_i$ ) of interest in a sample under test started with employing MS to find the concentration of its constituent molecules ( $C_i$ , mg/m<sup>3</sup>). Next, the Odor Detection Threshold ( $ODT_i$ , mg/m<sup>3</sup>) was determined from published works. Then the Odor Activity ( $OAV_i$ ) of the constituent molecules was calculated for the measured concentration levels ( $C_i$ ):

$$OAV_i = \frac{C_i}{ODT_i}$$

All molecules with  $OAV_i$  less than one were not considered important.

From the sample’s GC/MS results, a total Odor Activity for the sample under test ( $OAV_t$ ,  $OAV\_Sum$ ) can be computed:

$$OAV_t = \sum OAV_i \sim OC$$

Olfactometry was employed to find the Odor Concentration ( $OC$ , UO<sub>E</sub>/m<sup>3</sup>) of the sample.

The results of a nine-week experiment were presented. Figure 1 shows the correlation factor between the GC/MS-obtained OAV\_Sum and the olfactometry-obtained Odor Concentration over the nine-week experiment was 0.91. The major contributors the OAV\_Sum in week zero (W0) have been individually perceived in the literature as sweet, green plants and fermented.

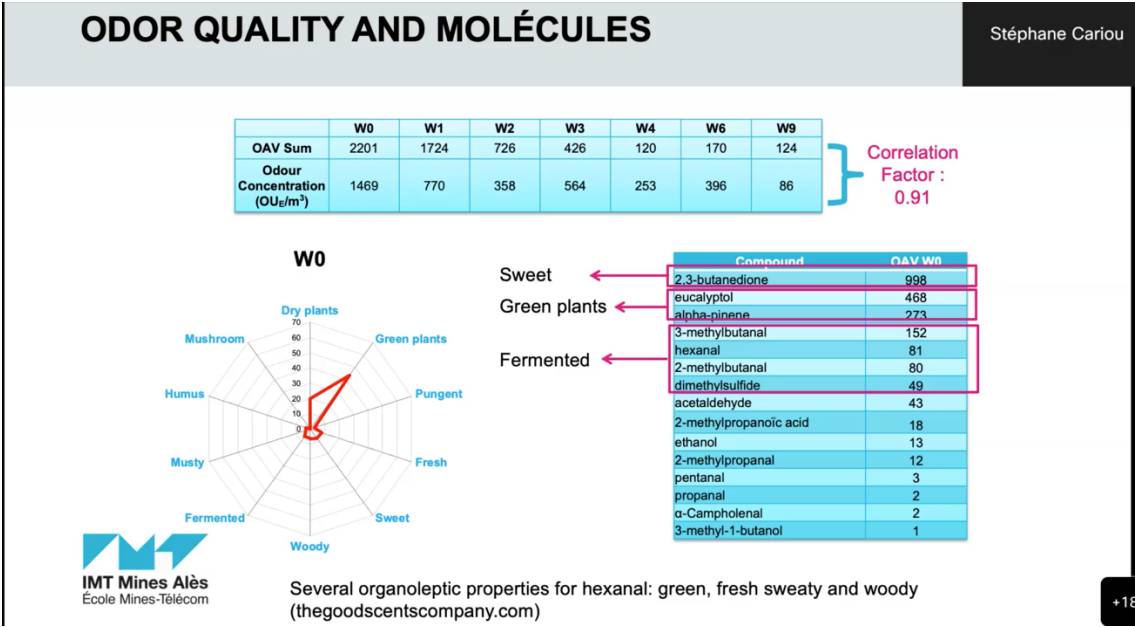


Figure 1

Figure 2 shows that by week nine (W9), one of the compounds was contributing 80% of the OAV\_Sum and the perception of the odor had changed.

	W0	W1	W2	W3	W4	W6	W9
OAV Sum	2201	1724	726	426	120	170	124
Odour Concentration (OU <sub>e</sub> /m <sup>3</sup> )	1469	770	358	564	253	396	86

Correlation Factor : 0.91

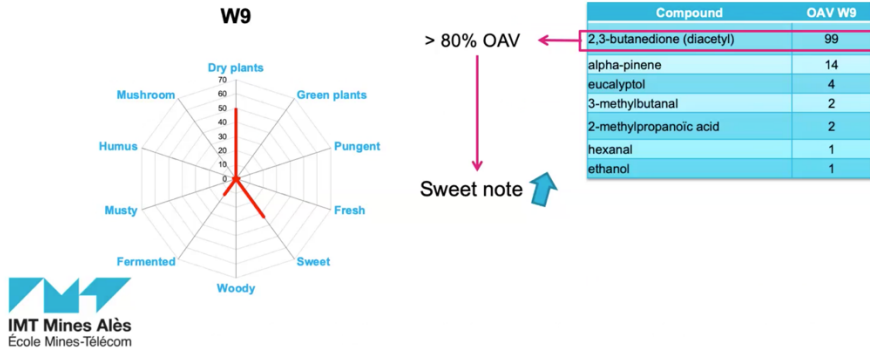


Figure 2

### Conclusions:

- Electronic instruments may be useful replacements for the expensive olfactometry approach.
- Method may be useful in identifying molecules that should be removed to reduce or modify odor.
- Further work is needed to improve the odor detection threshold and odor quality databases.

### b. General Discussion:

The Chair then led a general discussion as outlined below:

# DISCUSSION

What we agree on ...	What needs to be resolved ...
1. establishing "baseline" performance of the EUT P2520.1 WG (James Covington)	short and long-term stability (baseline drift) repeatability response time T/RH effects test analytes (gases and VOCs)
2. comparison to human olfaction	odour "perception" unit of measurement (OU) response correlation (eg, regression vs mean difference analysis - Bland Altman) sensory attributes (intensity vs hedonic properties - good/ bad smell)
3. need for reference odour (mixtures)	application dependent
4. defined test conditions	sampling and dilution concentration range (realistic levels) environmental effects/ cross-sensitivity lab vs field tests/ test duration & number of EUTs

The discussion will be continued in the next meeting. Can we build levels of performance in our standard? Quantitative, qualitative, and combinations thereof could be defined.

Next meeting, comparison to human olfaction will be the focus.

## 6. Unfinished Business/Action Item Review

There was no unfinished business.

## 7. New Business

There was no new business.

## 8. Future Meetings

The next meeting of the WG was scheduled to occur at 10 AM ET on March 13, 2023.

## 9. Adjourn

The hour having past, the WG Chair adjourned the meeting at 11:05 AM ET.

**Attachment A:** Meeting Participants (21)

<b>Last Name</b>	<b>First Name</b>	<b>Affiliation</b>
Cariou	Stéphane	IMT Mines Alés
Chen	Allen C	Self
Covington	James	Univ. of Warwick
Danesh	Ehsan	Adsentec Ltd
Deshmukh	Sharvari	Visvesvaraya National Institute of Technology
Guillot	Jean-Michel	IMT Mines Alés
Herrier	Cyril	Aryballe
Isz	Sandrine	Alpha MOS
Izquierdo	Cyntia	Olores.org website
Kavirayani	Srikanth	Gayatri Vidya Parishad College of Eng (Autonomous), Visakhapatnam
Loubet	Francois	Ellona
Majewski	Leszek	The University of Manchester
Mulla	Mohammad Yusuf	Research Institutes of Sweden (RISE)
Nagle	Troy	ECE, NC State University
Petrache	Ana	Beia Consult
Potyrailo	Radislav	GE Research
Reimringer	Wolfhard	Universität des Saarlandes, Lehrstuhl für Messtechnik
Sabry	Yasser	Faculty of Engineering, Ain Shams University
Saffell	John	NosmoTech Ltd.
Schiffman	Susan	North Carolina State University
Suciu Jr.	George	Beia-Ro