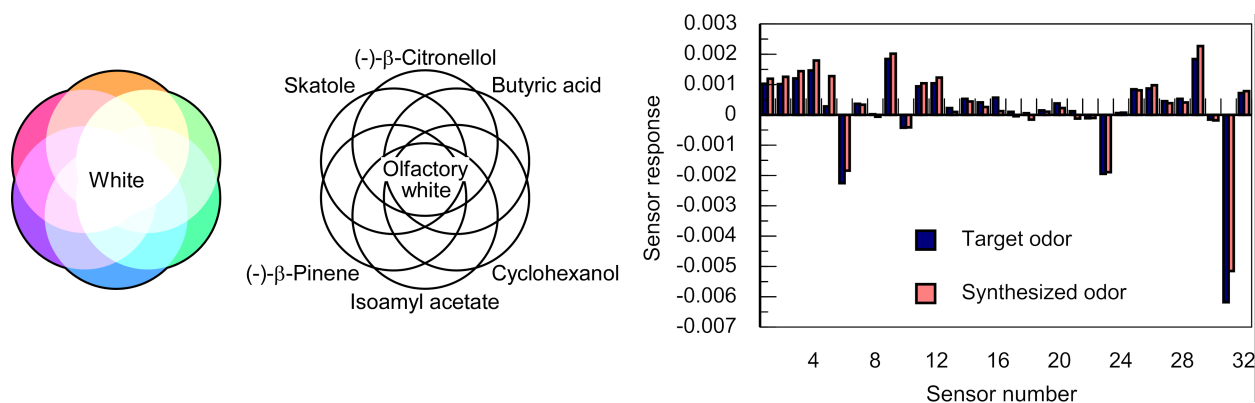


# Subtractive Mixing from Olfactory White: Challenges toward Versatile Odor Creation

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In vision, we can generate arbitrary colors by mixing three primary colors. In contrast, the existence of primary odors is questionable because of the diversity of our olfactory receptor cells. However, a phenomenon called “olfactory white” was discovered [1], claiming that a mixture of only 30 diversely different chemical substances approaches a certain smell, as if the mixture of different colors always approaches white. Inspired by this phenomenon, we have proposed subtractive odor synthesis [2]. A large number of components are generally contained in a single smell, and therefore, it is difficult to synthesize a specific odor by adding chemical components one by one from scratch. However, a wide range of odors can be generated by reducing some components from the olfactory white. When the target smell is given, its approximated smell can be synthesized by adjusting the component mixing ratio so that the response pattern of an electronic nose (e-nose) is matched. Among 33 different target smells tested, the response pattern of an e-nose has been successfully matched for 31 smells.



(Left) White is generated by adding colors even though they are not primary ones. (Middle) The olfactory white is generated by mixing 30 different chemical vapors. (Right) The response patterns of Cyranose 320 e-nose (Sensigent) to a target black tea flavor and its approximated smell, showing that a good match was obtained.

## Acknowledgment

This work was supported by JST Mirai Program (Grant Number JPMJMI25H1) and JSPS KAKENHI (Grant Numbers 25K22815 and 26K07437).

## References

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