

Fragrance and Flavor Analyzer Using Odor Deviation Map

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We developed a fragrance and flavor analyzer system that overcomes the drawback of electronic noses using metal-oxide semiconductors, i.e., the nonlinearity of their outputs with respect to the concentration of samples. This was realized by installing a dilution and mixing apparatus and a concentrating system before fragrance and flavor analyses as pretreatment systems, applying feedback to the sensor outputs for each measurement, and adjusting the lengths of vectors comprising the multiple sensor outputs to a certain value in the range where the sensor outputs are relatively linear. When the lengths of the vectors comprising the multiple sensor outputs are adjusted to a certain value for each measurement, the type of odor can be evaluated using the vector direction. The intensity of the odor is calculated from the dilution or concentration rate required to adjust the vector length to a certain value. By modifying this method, we also developed a technique of odor deviation mapping to quantitatively display changes in the type of odor. In odor deviation mapping, a reference odor and one or two odor deviations, which indicate the deviations from the reference odor, are selected while their vector lengths are being adjusted. Deviation axes are prepared on a map using vectors comprising sensor outputs obtained by adding each odor deviation to the reference odor, and the deviations of odors from the reference odor are quantitatively visualized on the map. As examples, applications of the map to the determination of expiration dates of foods and the identification of substances causing unusual odors are also discussed in this paper.

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