Development and validation of a colorimetric sensor array for fish spoilage monitoring -
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Given the need for non-destructive methods and sensors for food spoilage monitoring, we have evaluated sixteen chemo-
sensitive compounds incorporated in an array for colorimetric detection of typical spoilage compounds (trimethylamine, dimethylamine, cadaverine, putrescine) and characterized their color changes in response to compounds present in fresh products (hexanal, 1-octane-3-ol) used as negative controls. The colorimetric sensor array was used to follow fish spoilage over time at room temperature for up to 24 h as well as at 4 °C for 9 days. Additionally, fish decay was monitored using traditional assays measuring the quantity of thiobarbituric acid, total volatile basic nitrogen, changes in pH, O2 level, as well as following bacterial growth. We found a linear correlation between changes in pH, thiobarbituric acid content and the signal intensity recorded with the colorimetric array over time. During spoilage, the increase in signal intensity of the chemo-sensitive compounds showed a similar trend as the increase in microbial growth. We observed that the sensitivity of the chemo-sensitive compounds depends on the spoilage conditions (room temperature vs. 4 °C), highlighting the importance of the application of an array instead of single chemo-sensitive compounds when following complex changes during food spoilage.

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