Identification and detection of bioactive compounds in turmeric (*Curcuma longa* L.) using a gas sensor array based on molecularly imprinted polymer quartz crystal microbalance

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Abstract	Four bioactive compounds in turmeric (Curcuma longa L.) have been identified using a gas sensor array based on a molecularly imprinted polymer-quartz crystal microbalance (MIP-QCM). Four QCM sensors coated with MIPs were used to analyse the performance of the array sensor toward target compounds, namely ar-turmerone, curlone, ethyl-p-methoxycinnamate and, tumerone, at different concentrations. In this experiment, nine samples of Curcuma longa odour (CL1, CL2, CL3, CL4, CL5, CL6, CL7, CL8, and CL9) were exposed in a MIP-QCM sensor chamber. These analytes have been previously examined using gas chromatography-mass spectroscopy (GC-MS) to ensure the presence of the target compounds. GC-MS chromatograms indicated that the concentrations of the target compounds in nine analytes were distinct. The frequency change in the response due to the adsorption of the target compound with the selective layer coated on the QCM sensor was used as the sensor response. The performance of the MIP-QCM sensor array exhibited a higher response and better sensitivity and selectivity to turmeric odour with a high concentration of target compounds (CL1, CL2, CL3, CL4, CL5 and CL6) than the turmeric odour dominated by non-target compounds (CL7, CL8 and CL9). Principal component analysis (PCA) and backpropagation neural network (BPNN) were employed to analyse the sensor responses. The visualisation of the PCA score plot shows that the MIP-QCM array sensor performed highly in distinguishing the turmeric odour based on the composition of target compounds. The BPNN classifier reached an accuracy of 98.41% and 96.29% for categorising the samples using training data sets and testing data sets, respectively.
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