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Metal Phthalocyanine and Metal Oxide Modifying Multiwall Carbonnano Tube Paste Sensors for Classification of Sweet Taste

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In this work, high efficient sensor array for sweet taste classification was demonstrated for electronic tongue application. The sensor array was fabricated by electrochemical sensors based on multiwall carbon nanotube (MWCNT) paste blending with modify electroactive species including either nickel oxide (NiO), copper oxide (CuO), cobalt phthalocynine (CoPC) or iron phthalocyanine (FePC). The sensor arrays was design to response to varieties of sweet. Samples used for sweet taste classification had the same sweetness level with different kinds of sweeteners including of glucose, fructose, maltose, sucrose and honey. Cyclic voltammogram (CV) of the modified MWCNT paste sensor was performed in the sweet taste solutions in the range of 0 to 1 V. The CV feature of the metal phthalocyanines and metal oxides can be modified due to dominant oxidation and reduction of sugar molecule catalyzed by the blended materials. To classify sweet taste, input variables of principal component analysis (PCA) were extracted from the measured CV. The PCA results were clearly separated indicating that the sweet samples can be clearly classified by this modified sensor array. The relative positions of the data clusters can approximately relate to molecular weight of sugars, i.e. monosaccharide sugars (glucose and fructose) and disaccharide sugar (maltose and sucrose). The data group of honey presented at area between the area of mono- and di-saccharide sugar because this sweetener composed of both types of sugars. The PCA results also showed that the input parameters from CuO modified sensor had the strongest influence on the first principle component.

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