

Insight into the sensing mechanism of an impedance based electronic tongue for honey botanic origin discrimination



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Abstract

An impedance based electronic tongue was developed and used to discriminate honey of different botanic origin. The e-tongue presented here is based on the small-signal frequency response of the electrical double-layer established between the honey solution and an array of four different sensing units composed by gold, carbon, indium-tin-oxide, and doped silicon. The ability of the e-tongue to discriminate honey of different floral origins was demonstrated by distinguishing honey from Bupleurum and Lavandula pollen prevalence. The honey fingerprint obtained with the e-tongue was validated by parallel melissopalenogical analysis and physico-chemical methods. It is demonstrated that the e-tongue is very sensitive to changes on the honey electrical conductivity. Small differences in electrical conductivity are introduced by the presence of ionisable organic acids and mineral salts. Moreover, we propose that the sensitivity of the tongue to changes in electrical conductivity can be explored to probe other complex liquid substances.

Keywords

Electronic tongue; Small signal impedance; Electrical-double-layer; Honey