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作品名稱　假酒剋星－智慧攜帶式電子鼻整合晶片
A Smart Portable Electronic Nose SoC
for Fake Wine Identification

隊伍名稱　**神奇鼻子大智慧 Miraculous nose with great intelligence**

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作品摘要

市面上假酒的氾濫影響消費者的健康至鉅，但除非是有經驗的專家，一般人是不容易分辨的。假酒一般來說就是摻入工業酒精(甲醇)的酒，如果飲用可能會導致嘔吐、暈眩等症狀，更嚴重者會失明、腦出血，甚至是死亡。無論對商家或是個人消費者，都需要一個客觀、可靠、並且簡單的裝置或儀器，以作為判斷的依據。為了解決假酒問題，某某南韓公司甚至想開發專門的RFID晶片做為防偽手段。在本企劃中，我們提出一個判斷假酒的客觀方法，就是利用人工嗅覺的方式，也就是所謂的「電子鼻」。

電子鼻用途廣泛，可用來偵測假酒、腐壞食品、摻有機溶劑的劣質油品等，但是直到目前為止，所使用的電子鼻儀器都是在個人電腦或筆記型電腦上加裝氣體收集器與檢測器裝置，體積極為龐大，使用上很不方便，更談不上攜帶或家庭使用，其中的關鍵便在於缺乏有效的氣體收集、感測、辨識機制，以及其與電路系統之整合。本企劃鎖定醇類，使用聚合物材料以及新穎中孔碳/高分子奈米複合材料，結合MEMS製程、IC晶片設計、以及嵌入式軟體，擬開發出第一個能夠測量假酒的電子鼻系統晶片，用酒類來進行測試，以驗證低功耗可攜式電子鼻系統雛型之可行性。

ABSTRACT

Fake wine, mixed with methanol, has a huge effect upon the health of consumers. Drinking it would lead to vomiting and dizzying, moreover, blinding, cerebral hemorrhage and death. As the requirements for health management keep increasing nowadays, there is a need for an objective, reliable, and simple device to be used as a reference when people purchase wine. Here, we propose an objective way to detect fake wine, utilizing artificial olfaction, in other words, electronic nose. Until now, the electronic nose instruments used in these researches are desktop or laptop adding with air collector and detector device. The key is the lack of integration of efficient air collecting, sensing, recognition algorithm, device, and the circuit system. We use polymers and novel mesoporous carbon/polymer nanocomposite materials, integrated circuit design, and embedded software to develop the electronic nose SoC to detect fake wine and implement the feasibility of the low-power portable electronic nose prototype as shown in Fig. 1. The system block diagram and chip of the electronic nose are shown in Fig. 2 and Fig. 3, respectively. The front end of E-Nose system contains the sensor array. In this array, no single sensor responds to a special odor, instead a collective response of the entire array generates a particular pattern for the odor of interest. The response of sensor array will generate a distinct pattern, like a fingerprint. The sensor array sends the detected pattern through an interface circuit and analog to digital converter to the microprocessor of the system for signal processing. When the system enters the recognition mode, a gas enters the electronic nose system, and the microprocessor compares the sensor chip response pattern with existing patterns stored in the memory to identify the gas. The recognition results are exported by the microprocessor.