微型氣體感測晶片
The Smart Dust Sensor

執行單位：國科會工程處（儀科中心）

智慧微塵感測器技術是實現物聯網網狀交織於空氣品質監測的創新解決方案，由國科會攜手國研院儀科中心、半導體中心及國內卓越學術團隊，致力開發並成功實現國產氣體感測器的微型化、低功耗與高靈敏度，其核心技術具高靈敏度與穩定性，能即時監測多種氣體，提供具成本效益的創新模組，促進空氣品質監控設備普及化。

智慧微塵感測器並經過多個場域測試與第三方認證，涵蓋環境部測站(如台中大里測站)、遊憩公共場域（如公共廁所異味監測）及產業場景（如半導體廠房與污水處理設施)，有助於推動智慧城市空品監測解決方案的實現與發展。

The Smart Dust Sensor technology is an innovative solution for integrating IoT networks into air quality monitoring. Developed collaboratively by the National Science and The National Science and Technology Council (NSTC), in collaboration with Taiwan Instrument Research Institute (TIRI) and Taiwan Semiconductor Research Institute (TSRI) of NARLabs, and leading academic teams in Taiwan, this technology has successfully miniaturized gas sensors while achieving low power consumption and high sensitivity. Its core features include exceptional sensitivity and stability, enabling real-time monitoring of multiple gases. Moreover, the fully domestically developed technology reduces dependence on imports and offers cost-effective sensor modules, driving the widespread adoption of air quality monitoring devices.

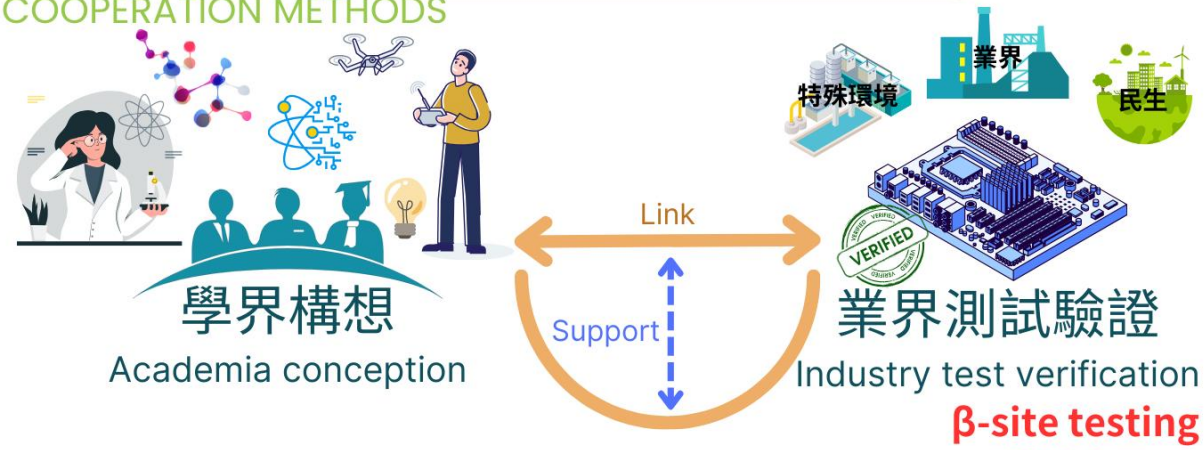
The Smart Dust Sensor has undergone extensive field testing and third-party certifications across various applications. These include

environmental monitoring stations (e.g., Taichung Dali Station), public recreational areas (e.g., odor monitoring in public restrooms), and industrial settings (e.g., semiconductor facilities and wastewater treatment plants). With its proven accuracy, reliability, and traceable data, the technology plays a key role in advancing air quality monitoring solutions, facilitating the development of smart cities, and contributing to improved environmental management.

智慧微塵感測器技術研發服務平台

智慧微塵感測器技術研發
Smart Dust Sensor Technology R&D

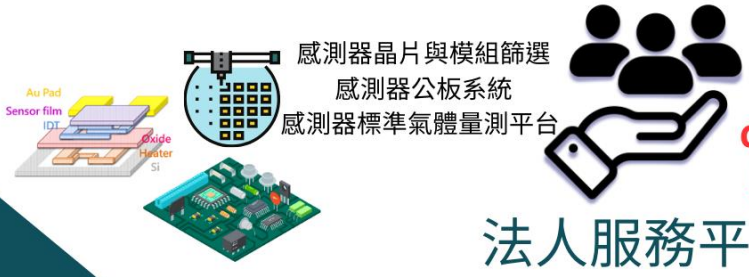
合作模式
COOPERATION METHODS



學界構想
Academia conception

業界測試驗證
Industry test verification

β-site testing
落地應用



感測器晶片與模組篩選
感測器公板系統
感測器標準氣體量測平台

α-site testing
與準量產試製

法人服務平台
Corporation Service Platform

智慧微塵感測器技術研發

Smart Dust Sensor Technology R&D

開發歷程
Development History

感測器公板系統
Sensor Public Board System

概念驗證 (Proof of Concept, POC)	• 建立公板規格(ASIC, 取樣率) • 建立感測器元件bonding標準 • 定義感測器元件介接條件(電阻值範圍)
服務驗證 (Proof of Service, POS)	• 國際標竿感測器平行比對驗證 • 感測器實驗室場域測試(α-site) • 感測器場域長效(2 week)測試(β-site)
商業驗證 (Proof of Business, POB)	• 智慧財產權布局(專利) • 技術移轉 • 經濟部工業局產業創新計畫提案 • 智慧城市計畫提案

氣體量測平台
Gas Measurement Platform

概念驗證 (Proof of Concept, POC)	• 規範氣體量測標的(種類、濃度) • 建立量測標準程序 • 量測設備規格擬定 • 追溯標準氣體來源
服務驗證 (Proof of Service, POS)	• 導入ISO17025:2017 • 國際標竿感測器平行比對驗證 • 感測器實驗室場域測試(α-site) • 感測器場域長效(2 week)測試(β-site)
商業驗證 (Proof of Business, POB)	• 技術移轉 • 設備精進優化 • 偕同開發