

吸附乾燥多功能應用與推廣計畫(2/2)

執行單位

工業技術研究院

計畫主持人

康育豪 博士

- 本計畫藉由通電直熱式吸附除濕核心技術之開發，延伸應用至壓縮空氣乾燥、常壓熱回收型吸附乾燥、烘乾防潮與空調除濕等設備，加速高效率乾燥除濕設備產業化，以落實節能減碳政策，並提升全國整體用電效率。

(1)P55050003，除濕輪，中國大陸、中華民國

(2)P55050011，多管式立體脈衝式熱管，美國、中國大陸、中華民國

(3)P55040007，除濕基材、除濕基材成形裝置及其成形方法，美國、日本

(4)P55040044，吸附材料與其形成方法與吸附式熱泵，中國大陸、中華民國

(5)P55030014，節能型壓縮空氣乾燥設備，美國

(6)P55040007，除濕基材成形裝置與方法，日本

(7)P55060001，除濕輪乾燥裝置及其組合的乾燥設備，美國、中國大陸、中華民國



低耗能高吸附量MOF製備圖示

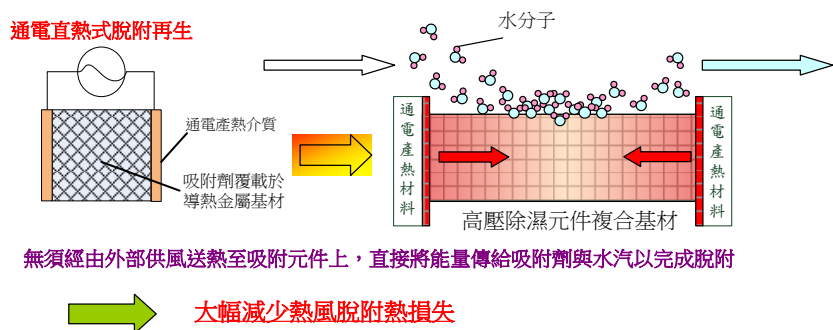


610mm型通電直熱輪商品化元件

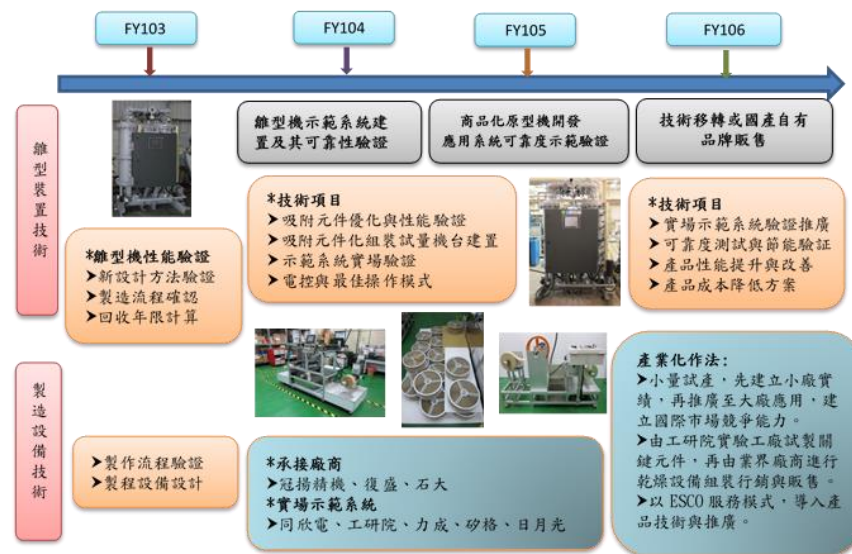


10CMM通電直熱吸附乾燥設備機

本計畫吸附乾燥多功能應用與推廣，主要目標在延伸應用及推廣前期所開發高效率壓縮空氣乾燥設備，核心技術概念如圖一所示，藉由耐高壓通電直熱吸附元件技術，將金屬基材吸附元件直接脫水汽化/再生，並結合高壓脫附再生密閉循環結構設計，降低乾燥設備之壓縮空氣再生氣量的損失，來完成低氣耗、低能耗之壓縮乾燥空氣設備開發，相較於傳統雙塔無熱式乾燥系統設備，可達節能效益30%。進一步利用關鍵通電直熱吸附元件技術，由高壓系統延伸應用至常壓吸附乾燥系統，增加本計畫技術之應用。圖二為本期計畫發展情形及產業化佈局規劃。



圖一、本計畫通電直熱再生吸附元件開發示意圖



圖二、本計畫發展情形及產業化佈局規劃

Multifunctional Applications and Promotion for Adsorption Drying

Execution Unit

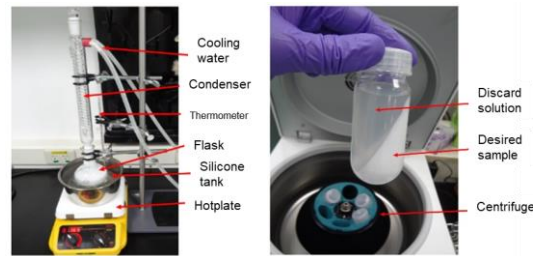
Industrial Technology Research Institute

Project Director

Dr. Yuhao Kang

- This project is to develop the core technology of adsorption dehumidification with directly electric-heating regeneration. This novel technology is also utilized to compressed air dryer, atmospheric pressure heat recovery adsorption dryer, dehumidifier and air conditioning system. The completion of this project is able to accelerate the industrialization of energy-efficient drying and dehumidification equipment. The policy of energy saving and carbon reduction is complied for improving the overall national electricity efficiency.

- (1)P55050003, dehumidification wheel, CN · TW
- (2)P55050011, multi-tube 3D pulse heat pipe, US · CN · TW
- (3)P55040007, dehumidification substrate · dehumidification substrate forming device and method, US · JP
- (4)P55040044, adsorption material and fabrication method and adsorption heat pump, CN · TW
- (5)P55030014, energy-efficiency compressed air drier, US
- (6)P55040007, dehumidification substrate forming device and method, JP
- (7)P55060001, dehumidification wheel device and comprising drying equipment, US · CN · TW



MOF fabrication for extreme high water adsorption capacity



610mm dehumidification wheel with directly electric heating regeneration (commercial device)



10CMM adsorption dryer with directly electric heating regeneration

This project is to study on multifunctional applications and promotion for adsorption drying. It mainly aims at developing high performance compressed air dryer equipped with extreme low energy consumption of regeneration. As shown in Fig. 1, the contents include synthesizing adsorbents and coating technology on metal substrate for directly electric-heating regeneration, desiccant device with gas-tight structure design, electric control and dryer system integrated. As this project completed, this high performance compressed air dryer could achieve more 30% of energy conservation than traditional heatless regeneration dryer. In addition, this directly electric-heating regeneration technology will also be extensively applied in adsorption drying at normal atmosphere condition. Fig. 2 shows the industrial strategic plan and technology roadmap of this project.

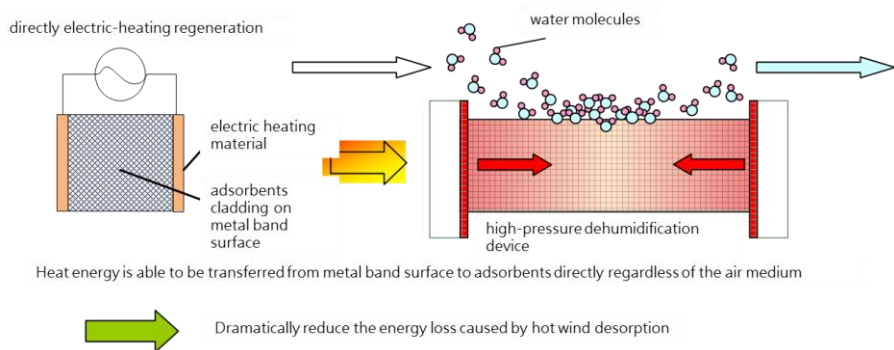


Figure 1. Concept of directly electric-heating regeneration technology

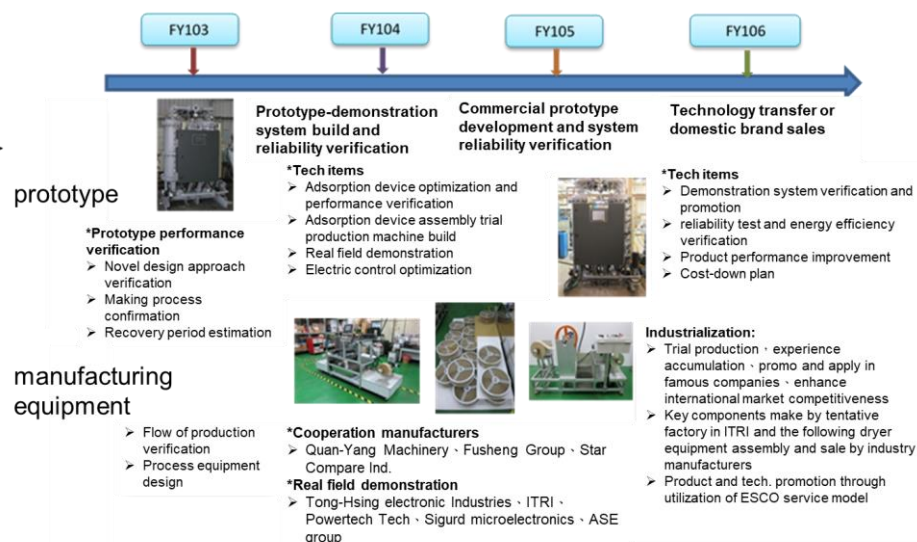


Figure 2. Industrial strategic plan and technology roadmap