

## 附件四、技術說明表



### 開發免標記摩擦奈米感測器用於藥物篩選平台

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**市場及需求：**該技術針對當前藥物篩選、環境偵測、食安檢測等市場的需求，提供了一種高效、低成本且具廣泛應用性的解決方案。

由於傳統方法通常存在高成本、假陽性率高、操作複雜等問題，市場對於該技術所提供的快速、靈敏且免標記的檢測平台有著強烈需求，尤其在藥物開發和環境監控等領域。

**技術摘要（含成果）：**本技術利用固液摩擦奈米發電機（TENG）原理開發了一種自供電、免標記的藥物篩選平台。該平台通過將機械能轉換為電能來檢測分子間的相互作用，具有高靈敏度、高選擇性及快速響應的特點。研究表明，該技術已成功應用於檢測蛋白質與小分子藥物之間的相互作用，顯示出較高的精確度與穩定性。

**優勢：**(1) 無標記：該平台不需要使用標記物，大幅降低了操作成本和複雜度。(2) 自供電：利用 TENG 技術，該平台不需要外部電源，提供更便捷的操作。(3) 高效能與高選擇性：該技術具有前所未有的選擇性和靈敏度，顯著減少了假陽性結果的出現。(4) 快速響應：能夠迅速檢測和分析藥物與目標蛋白的相互作用，縮短篩選時間，加速藥物開發。

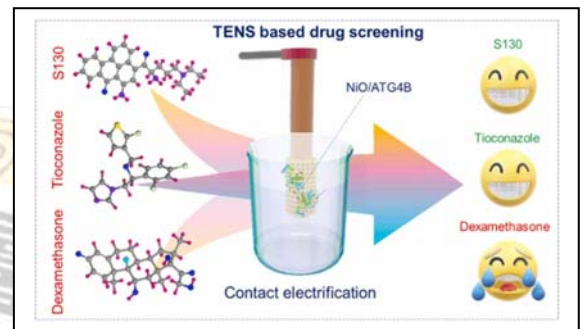
**競爭產品：**目前市場上的競爭產品主要是傳統的高通量藥物篩選技術，如等溫滴定量熱法（ITC）、表面電漿共振（SPR）和微量熱泳動（MST）。這些技術雖然成熟，但通常存在成本高、靈敏度不足且操作複雜的缺點。相比之下，本技術所提供的 TENG 自供電平台具有無標記、低成本和高選擇性的優勢，能夠有效應對上述傳統技術的局限性。

**專利現況：**

- (1) 本技術與本研究團隊已有專利相關（中華民國專利申請號：I808879、I829306、I809378、I717202；美國專利證號：11761918、11196358）。
- (2) 本研究團隊具有超過十年在摩擦奈米發電機（Triboelectric Nanogenerator, TENG）及自供電感測器暨系統（Self-Powered Sensors and Systems）的研究經驗。

**聯絡方式：**臺大產學合作總中心，Tel: 02-3366-9945，E-mail: [ordiac@ntu.edu.tw](mailto:ordiac@ntu.edu.tw)

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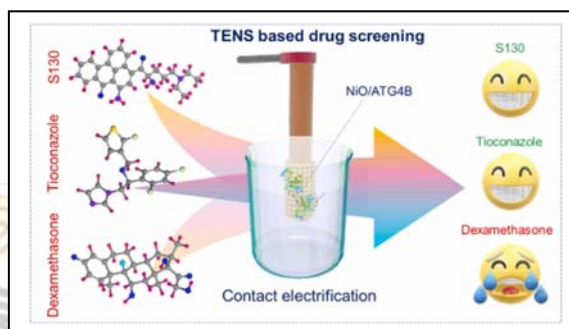
## Development of label-free triboelectric nanosensors as screening platforms for drugs

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**Market Needs** : This technology addresses the current market demand in drug screening, environmental monitoring, food safety testing, and other areas by providing an efficient, low-cost, and broadly applicable solution. Traditional methods often suffer from high costs, high false-positive rates, and complex operations. There is a strong market demand for the rapid, sensitive, and label-free detection platform offered by this technology, especially in drug development and environmental monitoring.



**Our Technology** : This technology leverages the principle of a solid-liquid triboelectric nanogenerator (TENG) to develop a self-powered, label-free drug screening platform. The platform detects molecular interactions by converting mechanical energy into electrical energy, offering high sensitivity, high selectivity, and rapid response. Research has demonstrated that this technology successfully detects interactions between proteins and small-molecule drugs, showing high accuracy and stability.

**Strength** : (1) Label-Free: The platform does not require the use of labels, significantly reducing operational costs and complexity. (2) Self-Powered: Utilizing TENG technology, the platform does not require an external power source, making it more convenient to operate. (3) High Performance and Selectivity: The technology provides unprecedented selectivity and sensitivity, significantly reducing the occurrence of false-positive results. (4) Rapid Response: It can quickly detect and analyze drug interactions with target proteins, shortening screening times and accelerating drug development.

**Competing Products** : The main competing products in the market are traditional high-throughput drug screening technologies, such as Isothermal Titration Calorimetry (ITC), Surface Plasmon Resonance (SPR), and MicroScale Thermophoresis (MST). Although these techniques are well-established, they often suffer from high costs, insufficient sensitivity, and complex operations. In contrast, the TENG self-powered platform provided by this technology offers advantages such as being label-free, cost-effective, and highly selective, effectively addressing the limitations of these traditional methods.

**Intellectual Properties** : (1) This technology is related to some of our patents (Taiwan Patent Application Numbers: I808879, I829306, I809378, I717202; US Patent Numbers: 11761918, 11196358). (2) Our research team has over ten years of experience in Triboelectric Nanogenerator (TENG) technology and self-powered sensors and systems.

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