

國家科學及技術委員會 函

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主旨：本會公開徵求114年度「精準物質操控：解碼淨零碳排與精準健康的關鍵機制」構想書，自即日起受理申請，請於113年11月30日前於線上系統送出，逾期不予受理，請查照轉知。

說明：

- 一、本計畫徵求公告請詳閱附件，或至本會網站(動態資訊/計畫徵求專區)或自然處公告網頁下載。有關計畫徵求說明會時程及報名訊息，請參閱公告訊息網頁。
- 二、請循本會「專題研究計畫/(構想書計畫類別)精準物質操控專案計畫」線上申請方式作業，線上繳交送出即可，無需經由申請機構送出，亦無須造冊函送本會。
- 三、構想書經審查獲推薦者，將通知計畫主持人及執行機構提送完整計畫書。本計畫之執行期程預計自114年8月1日起，採分年核定多年期方式辦理。
- 四、有關系統操作問題，請洽本會資訊系統服務專線，電話：(02)2737-7590、7591、7592。

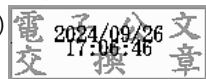
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正本：專題研究計畫受補助單位（共294單位）

副本：本會綜合規劃處、自然處(均含附件)



主任委員吳誠文

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國科會自然處

114 年度「精準物質操控：解碼淨零碳排與精準健康的關鍵機制」 構想書及計畫徵求公告

壹、計畫背景及目的

面對全球氣候變遷與人類健康永續的當前挑戰，「精準物質操控：解碼淨零碳排與精準健康的關鍵機制專案計畫」應運而生。本計畫聚焦於透過從材料、分子到原子層級的解析及精確操控，開發創新技術以有效降低碳排放並促進精準診斷與治療科技。在全球碳排放量持續攀升對健康及經濟造成的威脅下，及面對人口老齡化和慢性病盛行帶來的醫療壓力，這些創新技術的研發與應用顯得尤為迫切。

本計畫旨在解析關鍵議題及促進技術創新，透過精準物質操控技術解決淨零碳排放與精準健康管理的關鍵挑戰。計畫關注於解析原子和分子層面的機制及創新精確操控技術，以分子編輯及結構控制為核心，延伸至反應系統及檢測策略的設計等方向。在淨零議題，探索及實現對化學反應途徑和物質性質的精確調控，進而有效提升物質材料的效能，以及開發先進的分析方法，多角度評估催化劑的性能與反應控制體系。在健康領域，計畫聚焦於探索對人體健康具關鍵影響的分子，並運用精準物質操控技術進行檢測與開發靶向治療，亦包括利用合成工藝以提升功能性分子的效能及資料庫開發，用來強化或取代現有診斷型分子探針，提升靈敏度與精確性，從而為疾病的早期診斷與精準治療提供解決策略。

本計畫強調針對重要議題的跨領域合作與創新解決方案的開發，選定重大未滿足的需求，透過協同合作加速科學與技術發展，在面對技術發展的不確定性和潛在的高風險時，我們鼓勵學術界、研究機構以及產業界的合作，提出具前瞻性的創新技術方案，打破傳統界限，積極探索未知領域，尋求切實可行且具變革性的解決策略。本計畫期望這些努力能推動永續淨零碳排與精準健康管理的具體轉譯成果，以回應社會需求，並為未來的科技發展帶來實質性的進展。

貳、計畫研發方向

本計畫徵求之研究重點分為二大研究領域：

- 一、高效能源再利用及負碳策略技術：此領域可涵蓋但不限於碳捕獲與再利用、平價高效能之新穎觸媒催化劑、氫能技術、及高效率能源轉換技術的創新研發，以提高能源再利用、碳捕獲的效率或降低能源轉換過程中的能耗。這些技術旨在推動能源轉換效率提升，進而實現淨零碳排放的長遠目標。
- 二、精準健康診療技術：專注於開發能夠精確預防和診療潛在疾病的方法。透過高精度的健康診斷與治療科學方法，包括但不限於利用先進的分析技術手段，實現對疾病的早期診斷、預防和個人化治療，從而根據針對個體差異進行精準健康管理。

參、計畫內容撰寫說明

- 一、目標導向：總計畫內容須明確陳述整體總目標，選定重要議題，必須具有開創新思維，且以本計畫終極目標挑戰淨零碳排放與精準健康關鍵技術為宗旨。計畫內容必須包括四年研發目標、計畫規劃藍圖(roadmap)、國內外現況分析、所欲達成之量化技術指標、達到該指標之執行策略等要項。
- 二、前瞻解決方案及技術評估：由於淨零碳排放與精準健康技術之路徑多元，本次徵求計畫鼓勵學界勇於提出前瞻性解決方案。考量專案計畫的目標導向性，計畫中須明確定義各個技術查核點與技術可行性評估依據，必要時得研擬多種可能研發路徑並行。
- 三、產業參與：本計畫期能有效降低國內相關產業路線探索(pathfinding)過程之風險，鼓勵與業界進一步合作開發，促成業界投入下世代技術研究。
- 四、資源與專長整合：鼓勵籌組跨產學研、跨專長的研究團隊。除了實驗驗證，理論基礎的建立對評估高風險技術的投入與未來的發展潛力亦相當

關鍵，相關規劃須於計畫書中具體敘明。

五、國際競爭力：技術能力規劃須有國際領先之企圖心，積極參與相關活動如發表頂尖論文、參與比賽活動、國際參展等，以提升台灣相關領域之技術實力與國際能見度。

肆、計畫及構想書申請、審查及核定

一、申請須知

(一) 申請機構與計畫主持人(申請人)須符合本會補助專題研究計畫作業要點之規定。

(二) 本專案以申請分年多年期之單一整合型研究計畫為限。整合型計畫以包含 2 至 4 個子計畫為原則（含總計畫主持人 1 件），各子計畫主持人應實質參與研究，計畫書應詳實註明各子計畫負責之研究主題，整合之計畫需有整體明確的目標，並由總計畫主持人之服務機關提出申請。

(三) 研究計畫經費規模以每年 500-1000 萬元為原則，實際依審查結果及預算情形決定補助金額。

(四) 申請程序：分為「計畫構想書」與「完整計畫書」二階段

(1) 構想書階段：計畫構想書內容以 6 頁為限(格式如附件)。請循本會「專題研究計畫／(構想書計畫類別) 精準物質操控計畫構想書」線上申請方式作業，於 113 年 11 月 30 日(星期六)前繳交送出國科會系統。構想書經審查後將視審查成績邀請部分計畫申請團隊至國科會報告。

(2) 完整計畫書階段：構想書經審查後如獲通過，本會將另行通知申請機構提送完整計畫書。計畫主持人需於完整計畫書中修訂計畫架構內容。申請機構依本會通知時間完成線上申請作業，須彙整送出並造具申請名冊經有關人員核章後，將申請資料函送本會。計畫頁

數限制請依照本會公告之「專題研究計畫申請書表 CM03 研究計畫內容頁數限制一覽表」內相關規定。

二、 審查與核定

- (一) 審查方式包括書面初審及會議複審。本計畫屬專案計畫，審查未獲通過者，恕無申覆機制。
- (二) 本計畫申請人規劃四年期計畫(自 114 年 8 月 1 日開始)為原則，業經審查通過，核定補助分年多年期計畫；每年舉行計畫執行成果考評，並依審查結果核定次年期計畫。
- (三) 審查重點：
 - (1) 計畫提案之企圖心與本計畫欲突破當前技術瓶頸之契合度。
 - (2) 新穎性與學術研究卓越。
 - (3) 產業應用及技術之可行性。
 - (4) 具體技術規劃藍圖(roadmap)。
 - (5) 計畫所提技術之理論基礎。
 - (6) 計畫主持人之執行力。
 - (7) 團隊成員之互補性與跨領域、跨單位資源整合能力。
- (四) 本計畫列入國科會專題研究計畫件數計算額度，經核定補助後，列入總計畫主持人執行計畫件數，子計畫主持人則不列入計算。
- (五) 總計畫主持人限執行本專案計畫一件，並不得擔任本專案其他計畫案之子計畫主持人。

伍、 執行與考評

- 一、 本會將對執行計畫定期進行考評，執行團隊必須配合提供計畫執行進度與成果，並出席各項審查會議。

- 二、 執行團隊須配合本會進行計畫執行成果發表、推廣應用及交流等工作推動。
- 三、 各年度所需經費如未獲立法院審議通過或經部分刪減，國科會得依審議情形調整補助經費。
- 四、 如未依規定繳交報告或執行成效未如預期且計畫主持人未盡力改善時，得調減次年度經費或終止執行該計畫。

陸、其他注意事項

- 一、 本計畫之簽約、撥款、延期與變更、經費結報及報告繳交等應依本會補助專題研究計畫作業要點、本會補助專題研究計畫經費處理原則、專題研究計畫補助合約書與執行同意書及其他有關規定辦理。
- 二、 公告未盡事宜，應依本會補助專題研究計畫作業要點、本會補助專題研究計畫經費處理原則及其他相關法令規定辦理。

柒、計畫聯絡方式

國科會承辦人： 郭廷洋助理研究員

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E-mail：tykuo@nstc.gov.tw

有關計畫申請系統操作問題，請洽本會資訊系統服務專線

Tel：(02)2737-7590、7591、7592，0800-212058

National Science and Technology Council

2025 "Precise Substance Manipulation: Decoding Key Mechanisms for Net-Zero Carbon Emissions and Precision Health" Call for Proposals

Background and Objectives

In response to the global challenges of climate change and sustainable human health, the "Precise Substance Manipulation: Decoding Key Mechanisms for Net-Zero Carbon Emissions and Precision Health" project has been launched. This project focuses on the precise analysis and manipulation of materials, from the molecular to atomic levels, to develop innovative technologies that effectively reduce carbon emissions and advance precision diagnostics and treatment. With rising global carbon emissions threatening both health and the economy, and an aging population coupled with chronic diseases straining healthcare systems, the urgency of developing and applying these technologies has become increasingly evident.

The project aims to tackle key challenges in achieving net-zero carbon emissions and advancing precision health by leveraging precise substance manipulation technologies. It seeks to explore mechanisms at the atomic and molecular levels and develop innovative approaches for precise manipulation. Key aspects of the project include molecular editing and structural regulation, as well as the design of reaction systems and detection strategies. In the domain of net-zero carbon emissions, the project explores and implements precise manipulation of chemical reaction pathways and material properties, enhancing material performance. It also aims to create advanced analytical methods to thoroughly evaluate catalyst efficiency and reaction control systems. In the domain of precision health, the focus is on identifying molecules critical to human health and applying manipulation techniques for detection and targeted therapies. This also involves using synthetic processes to enhance the efficacy of functional molecules and developing databases to improve or replace existing diagnostic molecular probes, increasing sensitivity and accuracy for early diagnosis and precision treatment.

The project emphasizes interdisciplinary collaboration and the development of innovative solutions for critical unmet needs. Through coordinated efforts, it aims to accelerate scientific and technological progress. In light of uncertainties and potential high risks in technological development, we encourage academia, research institutions, and industry to collaborate on forward-looking innovations. These efforts are expected to yield concrete outcomes in achieving sustainable net-zero carbon emissions and advancing precision health, addressing societal demands and contributing to significant progress in future science and technology.

Research and Development Directions

The project focuses on two main domains:

1. **Efficient Energy Reuse and Negative Carbon Strategy:** This domain includes carbon capture and reuse, affordable high-performance catalytic materials, hydrogen energy, and innovations in high-efficiency energy conversion. The goal is to increase energy reuse efficiency, improve carbon capture effectiveness, and reduce energy consumption, ultimately driving long-term net-zero carbon emissions.
2. **Precision Health Diagnostics and Treatment:** This domain focuses on developing precise methods for disease prevention and treatment. It aims to achieve early diagnosis, prevention, and personalized treatment through highly accurate diagnostic and therapeutic techniques. It also focuses on drug design and development to address individual differences in precision health management and treatment.

Proposal Guidelines

1. **Targeted Objectives and Key Focus Areas:** The overall project proposal should clearly state the main objectives and highlight key challenges, with a focus on innovative solutions. The ultimate goal of the proposal is to address the critical technologies for achieving net-zero carbon emissions and precision health. The project content should include four-year R&D objectives, a comprehensive technical roadmap, domestic and international situation analysis, quantifiable targets, and strategies for achieving these targets.

2. **Innovative Solutions and Feasibility Assessment:** With diverse pathways to achieving net-zero carbon emissions and precision health, we encourage applicants to propose innovative solutions. The proposal should clearly define milestones and include a feasibility assessment. If necessary, multiple R&D approaches can be pursued in parallel.
3. **Industry Collaboration:** The project aims to reduce pathfinding risks for domestic industries by fostering industry partnerships. It encourages collaboration to develop next-generation technologies and boost industry investment in advanced research.
4. **Interdisciplinary Collaboration and Resource Integration:** The formation of interdisciplinary teams involving academia, research institutions, and industry is highly encouraged. Beyond experimental validation, theoretical foundations are also essential for evaluating high-risk technologies and guiding future developments.
5. **International Competitiveness:** The proposal should reflect a strong ambition to achieve international leadership, including publishing in top-tier journals, competing in international contests, and attending global exhibitions. These efforts aim to strengthen Taiwan's technical capabilities and boost its international visibility in related fields.

Proposal Submission

1. Applying institutions and principal investigators (PIs) must adhere to the National Science and Technology Council (NSTC) regulations.
2. The proposal is limited to multi-year integrated research plans, each consisting of 2 to 4 sub-projects (with one led by the project lead). Sub-project PIs must actively participate in the research, and the proposal should clearly define the research topics for each sub-project. The integrated project must have a clearly defined overall objective and be submitted by the project lead's affiliated institution.
3. The annual budget typically ranges from 5 to 10 million NTD, with the final amount contingent on review results and available funding.
4. The application process consists of two stages— "Concept Paper" and "Full Proposal":
 - (1) Concept Paper Stage: The concept paper should be limited to 6 pages (following the

provided format). Applicants must submit it online through the NSTC system by Nov. 30, 2024. After review, selected teams will be invited to present their proposals.

- (2) Full Proposal Stage: Once the concept paper is approved, the NSTC will notify the applicant's institution to submit a full proposal. The PI must revise the full proposal as needed. The applicant institution must complete the online submission by the specified deadline. The full proposal must adhere to the page limits outlined in the "Proposal Guidelines (Form CM03)."

Review and Funding Approval

1. The review process includes a documentary review followed by a committee evaluation. As this is a special project, there is no appeal process for rejected proposals.
2. The project is structured as a four-year plan, starting from August 1, 2025. Upon approval, multi-year funding will be provided, with annual evaluations to monitor project progress and outcomes. Funding for subsequent years will be contingent on the results of these reviews.
3. Evaluation Criteria:
 - (1) Alignment of the proposal's ambition with the project's goal to address technical challenges.
 - (2) Novelty and excellence in academic research.
 - (3) Feasibility of practical applications.
 - (4) A well-defined technical roadmap.
 - (5) Theoretical foundations of the proposed technologies.
 - (6) Execution capability of the PI.
 - (7) Complementary strengths of team members and their capacity for interdisciplinary integration.
4. Once funding is approved, this project will count toward the project lead's total project quota under NSTC regulations, but it will not count toward the sub-project PIs' quotas.
5. The project lead may lead only one project under this program and cannot serve as a sub-project PI for any other projects in the program.

Project Execution and Evaluation

1. The NSTC will conduct regular evaluations, and the project team must provide progress updates, results, and attend review meetings.
2. The project team must work with the NSTC on reporting outcomes, advancing applications, and facilitating outreach and promotion.
3. If the total program budget for any financial year is not approved or is reduced, the NSTC may adjust the funding accordingly.
4. If performance is unsatisfactory without improvement, funding may be reduced or the project terminated.

Additional Considerations

1. Project contracts, funding usage, extensions, amendments, financial reporting, and report submissions must comply with NSTC regulations.
2. For matters not covered here, please follow NSTC regulations.

Contact

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