# 「臺美奈米材料基礎科學研發共同合作研究計畫」構想書徵求公告

# (NSTC-AFOSR Taiwan Nanoscience Basic Research Topological and Nanostructured Materials Synthesis and Discovery)

一、計畫目標

臺灣與美國空軍之國際合作計畫(NSTC-AFOSR Taiwan Nanoscience Basic Research Topological and Nanostructured Materials Synthesis and Discovery)，係為臺灣與美國研究人員提供交流與合作的平台，藉此能夠了解國際研究方向，及激發奈米科學最新技術，臺美雙方於 107 年以同步公開徵求與各自補助計畫的方式開始進行合作。現在公開徵求 113 年度新的三年期雙邊合作計畫。

本徵求公告之訂定日期時間係以臺灣時間為準。

二、申請條件

(一) 計畫主持人與共同主持人之資格，須符合「國科會補助專題研究計畫作業要點」相關辦法之規定。申請機構須為本會專題研究計畫之受補助機關。本計畫歸屬「雙邊協議專案型國際合作研究計畫」件數，不列入本會研究計畫件數的額度計算，惟以 2 件為限。

(二) 合作對象：**需包含 1 個(含)以上的美方研究人員。**該美方研究人員之服務機構，必須為美國學術研究單位或美國國防部(DoD)之受補助實驗室。如對美方研究人員資格有疑問，請與本案美方負責人員聯絡。美國空軍聯絡人 AOARD IPO: Dr. Todd S. Rushing, Email: todd.rushing@us.af.mil

三、徵求內容

The scientific focus will be on novel materials and nanostructures that can advance science in the following concentration areas:

(1) We seek discovery of novel quantum materials and heterostructures with emergent phenomena or functionalities that enable transformative electronic and bio/chemical applications. Understanding and controlling the evolution of quantum material behaviors is critical. Advanced theoretical approaches to predict new quantum phases and materials which exhibit these properties, and to describe known quantum phases are sought. Intrinsic magnetic topological materials and Moiré engineered systems are of interest.

(2) We seek advanced materials that exhibit unique properties and phenomena towards the next-generation computation, communication, and photonic sensing as follows:

- Neuromorphic computing: The use of brain-inspired architectures to perform

massively parallel computation with extremely low power consumption due to the neural network nature are promising platforms for machine learning applications. Development of solid-state, organic, or bio-compatible materials and devices to emulate synaptic or neural operations are desirable.

- Quantum communication: The quantum mechanical nature of light waves allows us to encrypt and transmit data with ultimate security and capacity. Scientific advances toward the generation, manipulation, storage, and detection of non-classical light (e.g., single photons, entangled photons, etc.) based on novel devices or materials are sought.
- Quantum Sensing: New discoveries related to the detection and measurement of various physical, chemical, and biological parameters by leveraging quantum phenomena are sought. Novel material/nanostructure concepts that can achieve improved sensitivity, precision, reliability, and integration beyond existing quantum technologies in fields including, but not limited to, bio/molecular-sensing, nano-plasmonic sensing, quantum metrology, or lab-on-chip are of interest.

(3) Terahertz electronics: We seek scientific breakthroughs in materials, heterostructures, and devices that can lead to game-changing capabilities in very-high-speed digital electronics, transmit/receive functions, wideband operation, and novel functionalities. Focus should be on fundamental interactions of electrons and quasiparticles with each other and their host materials in all regions of device operation. Technical challenges include understanding and controlling interactions between particles/quasiparticles and host lattices, boundaries, and defects, including effects of bias, temperature, and time. Conventional and superconducting transport are of interest.

四、申請流程與注意事項

1. 申請流程：本計畫申請區分「構想書(Pre-proposal/whitepapers)」及「完整計畫書(Full-proposal)」兩階段，由臺美雙方共同審查。**臺美雙方之申請人，必須分別向其補助機構依規定提出申請書。**
2. 構想書格式：如附件，且每位申請人(/計畫主持人)**以申請 1 件為限**。
3. 計畫執行期限：民國 113 年 8 月 1 日至 116 年 7 月 31 日，共 3 年。
4. 經費編列注意事項：計畫主持人配合臺方與美方之相關規劃，進行年度或期末成果簡報致使產生業務費、國外差旅費等相關支出，由該計畫經費項下勻支，不得另案再向本會申請。
5. 構想書申請期限及送達方式：請循本會「專題研究計畫／(構想書計畫類別)臺美奈米材料基礎科學研發共同合作研究計畫構想書」線上申請方式

作業，申請截止日期為 **112 年 10 月 12 日(含當日)**。
申請人於系統繳交送出後，顯示「計畫狀態：繳交送出(國科會)」。
本階段我方申請案**不須**經申請人任職機構於系統中彙整後送出。

6. 構想書審查方式：確定臺美雙方之申請人皆符合申請資格後，如有必要，申請人需至本會進行簡報並接受詢答，未進行簡報者，其申請案不予推薦。本計畫經費係專款專用，無申覆機制。
7. 審查重點：
   - 研究內容必須具有創新性，著重於基礎科學原創性研究。
   - 雙邊合作的必要性。
   - 具發展潛力及未來性。
8. 構想書審查結果通知：構想書審查獲推薦者，將由本會自然處正式行文通知申請機構與申請人於期限內，提送完整計畫書(Full-proposal)，由申請機構造具名冊備函送達本會。

六、成果報告繳交、審查及評鑑

計畫主持人除依本會規範繳交研究成果等報告外，應於全程期末配合本會辦理成果審查等計畫評鑑作業。計畫主持人亦須配合臺方與美方之相關規劃，進行年度或期末成果簡報。

七、聯絡資訊

國科會自然處：王心頎小姐，Tel：02-2737-7522。
徐文章研究員，Tel：02-2737-7522。
美國空軍 AOARD IPO: Dr. Todd S. Rushing, Email: todd.rushing@us.af.mil