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中台灣奈米技術科學與工程核心設施計畫---子計畫三：

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摘要

本計畫目標是發展奈米製程，透過資源整合與分享之概念採購相關機台。計畫三年中，分別採購電感耦合活性離子蝕刻機、高壓反應器、分子束磊晶、及離子濺鍍機。同時配合本校之微影製程專長，和既有之光微影及電子束微影機台，全力發展奈米結構之製程技術及元件。配合電子束微影術及電感耦合活性離子蝕刻機，我們成功的發展奈米機電製程，矽基材料的結構成功展示 100 奈米且高寬比四十之柱狀陣列，相信對奈米機電的發展有助益。而配合分子磊晶機台，預計可以發展奈米半導體結構與元件之製程，目前鎖定氮化鎵基材多層膜，以發展發光及雷射二極體為目標，預計在低維度結構之發光特性能提供研究與服務。高壓反應器等相關設施則成功的成長奈米二氧化鈦奈米線等。而離子濺鍍機(近期組裝)則預期長新穎磁性多層膜。簡單而言，我們發展奈米微機電及光電半導體之製程機台與技術，結合其他子計畫，可以達成資源整合與共享之目標。

Abstract

The objective of this sub-project is to establish nanofabrication processes for researcher in the central part of Taiwan. Related facilities were allocated and purchased in the past three years through overall integration and sharing within the joint-project. During the last three years the equipments purchased are inductively coupled plasma reactive ion etcher (ICP RIE), high pressure reactor chamber equipped with FTIR, molecular beam epitaxy (MBE), and ion beam sputtering machine. Together with the expertise of lithography, such as photolithography and electron beam lithography, built up in the past in this campus it is the final goal as to develop nanofabrication processes. With the ICP RIE technique associated with the electron beam lithography a NEMS process has been set up with the capability of making 100nm silicon pillar array which has pillar height to diameter aspect ratio of 40. The goal of MBE is to make low dimensional devices of light emitting and laser diodes of GaN multilayer and other semiconductor systems. The high pressure reactive chamber has enabled us to synthesize TiO₂ nanowires. The ion beam sputtering system expected to be set up soon is mainly focused on the magnetic multilayer systems. Overall speaking, we have built up a nanofabrication center through existed and newly purchased equipments and these will enable us and others in the central part of Taiwan to have better chance in the research of nanotechnology related fields.