# 行政院原子能委員會

# 委託研究計畫研究報告

**纖維原料水解液高效率發酵菌株之研究及程序開發**

**Study of the effective celluloase hydrolysate-fermentative microbe and development of the microbe-based process**

**計畫編號：1022001INER039**

**受委託機關(構)：逢甲大學化工系**

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# 目　錄

**中文摘要**

為了發展大腸桿菌之琥珀酸醱酵的技術平台，在今年度的計劃中我們所提議的主要策略在於改造細胞的代謝途徑，以導引碳流至琥珀酸，目前獲致的成果如下：(1)完成基因剃除工具箱的建構，藉此剔除競爭代謝路徑，以減少能源的消耗和碳流量的損失；(2)完成原位鑲箝啟動子工具箱的建構，藉此強化關鍵基因的表現，以導引碳流匯流至琥珀酸；(3)進行先期醱酵條件之探討，結果發現建構菌株可由 30 g/L 葡萄糖轉化生成 10 g/L 琥珀酸，莫爾轉化率達 61%。

關鍵字：代謝工程、染色體工程、琥珀酸

**Abstract**

This study is aimed at to develop a technique platform for fermentative production of succinic acid in *Escherichia coli*. In this year, the main strategy as proposed is to engineer metabolic pathways of *E. coli* in order to redirect the carbon flux towards succinate. Our current results are as follows. (1) The construction of a gene deletion toolbox was completed. The competing pathways were then removed using this toolbox to curtail the waste of energy and byproduct production. (2) The construction of a promoter-insertion toolbox. The key pathways were enhanced using this toolbox to channel the carbon flux into succinate node. (3) The preliminary study of succinate fermentation was conducted. As a consequence, the engineered strain was able to produce 10 g/L succinate from 30 g/L glucose. This result accounts for a molar conversion yield of 61%.

Keywords: Metabolic engineering, Genomic engineering, succinic acid