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二氧化矽、氧化鋅及氧化鉻奈米粉體的細胞毒性評估

The Assessment of the Cellular Toxicity of SiO_2、ZnO and Cr_2O_3 Nanopowders

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摘 要：本實驗是分別將工業技術研究院所研製的氧化錫、二氧化矽及氧化鉻普通粉體及奈米粉體，在不同濃度（1 ppm、10 ppm、100 ppm 及 1,000 ppm）下對四種人類細胞株進行細胞毒性測試。計算細胞存活率將以錐藍質排除測試 (trypan blue exclusion test) 及 MTT assay 的方法進行，並以倒立式顯微鏡觀察不同粉體濃度在細胞培養液下的變化，及細胞在受測環境下的型態改變。實驗結果顯示無論是普通或是奈米尺寸，這三種化合物對各種細胞的毒性依序是氧化錫>氧化鉻>二氧化矽，在 1,000 及 100 ppm 的氧化錫濃度下與細胞培養 24 小時，所有受測細胞的存活率幾乎等於零（K-562 細胞株除外），而二氧化矽及氧化鉻則仍有細胞存活。另一方面比較同一種化合物但不同尺寸的粉體對細胞的毒性如何，我們發現氧化錫在奈米化後似乎對細胞（HeLa、HepG2/C3A 及 MRC-5）的毒性變小了（在 100 ppm 濃度下各種細胞存活率平均約升高 8%），有趣的是二氧化矽在奈米化後對細胞的毒性反而增大（在

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100 ppm 濃度下各種細胞存活率平均約降低 40%），而氧化鉻則較無較顯著的改變。在白血球細胞株 (K-562)則發現普通及奈米粉體的化合物，細胞毒性的差異較小。由上述實驗我們可清楚了解不同尺寸或型態的粉體對細胞的毒性是有極大的差異性，而且對不同型態的細胞（黏貼性或懸浮性）也會造成不同的影響。我們希望藉此實驗能提供各類奈米粉體對人體細胞影響的訊息給於相關單位，以建立奈米材料製造的安全法規。

關鍵詞：奈米粉體、細胞毒性、二氧化矽、氧化鋅和氧化鉻

Abstract: In this study, the normal- and nano-sized ZnO, SiO_2 and Cr_2O_3 powders, which provided from Industrial Technology Research Institute (ITRI), were assessed by cellular toxicity in four kinds of human cell lines under different concentrations (1 ppm , 10 ppm , 100 ppm and 1,000 ppm). Cell survival rate of test cells were measured by the method of trypan blue exclusion and MTT [3-(4,5-dimethy- lthiazol-2-yl) -2,5- diphenyltetrazolium bromide] assay, and images of both types powders and cell morphological changes in different powders' concentrations were observed by the inverted microscope. The experimental results showed normal- or nano-sized compound powers all were toxic to various kinds of cells and the toxicity was in the following order: ZnO> Cr_2O_3> SiO_2. The survival rates of test cell lines in 24 hours incubation under the concentrations of ZnO in 1,000 and 100 ppm dropped nearly to zero (except K-562 cell line), but still had the cells that survived in the same treatment with SiO_2 or Cr_2O_3. On the other hand, the same property chemical compound but in different size were analyzed in cell toxicity test. We found the nano-sized ZnO toxicity in HeLa, HepG2/C3A and MRC-5 had diminished (the survival rates of various kinds of cells raised 8% averagely under 100 ppm concentration when compared to normal-size ZnO). Interestingly, the cell toxicity of nano-sized SiO2 had increased (the survival rates of different types cells averagely reduced to 40% under the concentration in 100 ppm), however, there did not have apparent change in Cr_2O_3. We also found that the test powders whether in normal- or nano-sized, the cell toxicity was little different in the leukemia cells (K-562). These data suggest that different sizes or types of the powders have great different toxicities in cells, and will cause different influences on cells with different properties (adherent or suspend). We hope to make use of this study to offer the cellular toxicity information of nano-sized powders to the relevant unit, in order to set up the secure legislation of nanomaterial production.

Key words: Nanopowder, Cellular toxicity, SiO_2, ZnO and Cr_2O_3

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洋紫荊(*Bauhinia purpurea)*種子中胰蛋白酶抑制劑之純化及其特性

Purification and Characterization of a Trypsin Inhibitor from *Bauhinia purpurea* Seeds

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摘 要：利用硫酸銨分割，Sephadex G-50 凝膠過濾色層分析法，DE-52 cellulose 陰離子交換樹脂及 trypsin-Sepharose 4B 親和性管柱，可以從洋紫荊(*Bauhinia purpurea)*種子中純化出一種胰蛋白酶抑制劑（ *Bauhinia purpurea* trypsin inhibitor），簡稱 BPTI。洋紫荊屬於豆目(Leguminosae)、蘇木科（Caesalpiniaceae），**學名：***Bauhinia purpurea Linn.*，利用 SDS-PAGE 分析所純化之 BPTI，得知其分子量約 20 kDa，由單一條多胜鏈所組成，是屬於 Kunitz-type 蛋白酶抑制劑。進一步對此蛋白的性質研究，發現 BPTI 在 60℃ 30 分鐘仍保有大於 50%的活性，但如果到 80 及 100℃，則活性僅殘留 27 及 17%左右。在廣泛的 pH 範圍及還原劑 DTT 處理，BPTI 其抑制胰蛋白酶的活性仍然非常穩定，故 BPTI 結構的穩定與雙硫鍵的存在沒有明顯的相關性。

關鍵詞：洋紫荊、胰蛋白酶抑制劑、Kunitz-type 蛋白酶抑制劑

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Abstract: A trypsin inhibitor (BPTI) was purified from seeds of *Bauhinia purpurea* by 70-90% ammonium sulfate precipitation, Sephadex G-50 column, DE-52 ion-exchange column and trypsin-Sepharose 4B affinity chromatography. A molecular weight of 20 kDa and single polypeptide chain was estimated by SDS-PAGE. The BPTI was found to be a thermostable Kunitz-type TI that inhibits trypsin at molar ratio 1:1. The stability of BPTI was studied by exposing it to altered conditions of temperature, and measuring the residual inhibitor activity. The inhibitory activity retained at least 50 % activity after being heated to 60 ℃ for 30 min, but there were 73 and 83% losses of activity at 80 and 100 ℃, respectively. The inhibitory activity was stable over a wide pH range and in the presence of DTT. The stability of BPTI is apparently not related to the presence of disulfide bridge.

Keywords: Kunitz- type trypsin inhibitor, *Bauhinia purpurea*, BPTI

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利用水熱合成含吡啶雙羧根及菲囉啉之鈷(Ⅱ)金屬配位化合物及其構造分析

Hydrothermal Synthesis and Structure of the Cobalt(Ⅱ) Complex based on Pyridinedicarboxylate and Phenanthroline

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摘 要：將 2,6-吡啶雙羧酸與 NaOH 反應，再與 $Co(NO_3)_2 \cdot 6H_2O$ 與菲囉啉加水混合，利用水熱反應合成，得到含鈷(Ⅱ)的配位錯合物，其化學式爲$[Co(pda)(phen)(H_2O)] \cdot 2H_2O$ **(1)** (pda = 2,6-吡啶雙羧酸根 , phen = 1,10-菲囉啉)。使用元素分析儀、 FT-IR 光譜儀及 X-Ray 晶體繞射儀，測定產物晶體結構及其性質，X-Ray 測定結果顯示錯合物 **1** 是以鈷(Ⅱ)離子爲配位中心，含兩個 O 原子，以及三個 N 原子和一個配位水分子以及兩個晶格水分子；氧原子分別來自一個吡啶雙羧酸上的第二位置以及第六位置上的 O 原子，氮原子分別爲雙羧酸吡啶環上的氮原子及菲囉啉環上的兩個氮原子，配位構成些微扭曲八面體型的幾何結構，具有 Cs 對稱性。吡啶雙羧酸配位基以及配位水分子和兩個未配位晶格水分子，由於吡啶雙羧酸以及配位水分子

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和晶格水分子的分子間氫鍵(O-H---O)、分子內氫鍵(C-H---O)作用，以及芳香環之間的 π-π 吸引力，自組裝成(3-D)三維空間無限延伸的網狀結構，使得此晶體結構很穩定。

關鍵詞：水熱合成、2,6-吡啶雙羧酸、1,10-菲囉啉、氫鍵

Abstract: A metal-organic coordination complex, $[Co(pda)(phen)(H_2O)]\cdot 2H_2O$ **(1)** (pda = 2,6-pyridinedicarboxylate, phen = 1,10-phenanthroline), has been hydro thermally synthesized from the reaction of $Co(NO_3)_2\cdot 6H_2O$, NaOH, 2,6-pdaH_2 and phen. The compound was structurally characterized by elemental analysis, FT-IR and single-crystal X-ray diffraction. X-ray structure analyses show the cobalt (II) atom of the title compound is coordinated by two oxygen atoms, three nitrogen atoms and one water molecule. Two lattice water molecules were also found in close proximity to cobalt(Ⅱ). The two oxygen atoms are from to carboxyl acid (at pyridine 2 and 6 position). One of the nitrogen atoms is from to pda ligand and the others are from to phen ligand. The cobalt(Ⅱ) center can be described as a slightly distorted octahedral coordination with an approximate Cs symmetry. The structure extends to a new 3-D supramolecular network by π-π stacking interactions between aryl rings and intermolecular (O-H···O)、intramolecular (C-H···O) hydrogen-bonding between pyridine-dicarboxylate, coordinated water molecules and lattice water molecules.

Key words: Hydrothermal Synthesis, 2,6-Pyridinedicarboxylic acid, 1,10-phenanthroline, Hydrogen bonding.

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金狗毛蕨之成熟度指標

Indicators of the Maturity of *Cibotium barometz* (L.) J. Sm. (Dicksoniaceae, Pteridophyta)

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摘 要：金狗毛蕨爲台灣大形稀有之原生蕨類，本研究比較不同的形態介量，評估對植株成熟度與孕性葉預測之指標性。就植株成熟度而言，由於成熟植株之莖幹顯著地大於未成熟植株之莖幹直徑，且兩者重疊度低，對於植株成熟度的指標比其它形態介量，如：葉片數、葉長、葉身長、葉身寬、葉形(葉身長/葉身寬)，更具預測性。從葉形介量(葉身長/葉身寬)可測知成熟植株之葉子較爲長橢圓及/或狹長狀。儘管葉長、葉身長或葉身寬等形態介量，在非孕性葉與孕性葉之間達到極顯著差異，然而具有高度重疊度，並不適合作爲預測葉片孕性之指標。

關鍵詞：金狗毛蕨、蚌殼蕨科、蕨類植物、孕性、成熟度

Abstract: *Cibotium barometz* is a large, rare fern native to Taiwan. This study evaluated the

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appropriate indicators of plant maturity and frond fertility by various morphological parameters. The caudex diameter is a better parameter to express the plant mature stage than other parameters, such as frond number, frond length, blade length, blade width, and frond shape (blade length/ blade width) based on its significant difference and lower overlap degree between mature and immature plants. The leaf shape, which was measured by “blade length/ blade width”, was more oblong and/or slender when the plant matured. Despite frond morphological parameters, such as frond length, blade length, and blade width were significantly different between the fertile and sterile fronds. They could not represent appropriate indicators to evaluate the leaf fertility due to their high degree of overlapping.

Keywords: *Cibotium barometz*, Dicksoniaceae, Fern, Fertility, Maturity

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穴位按壓對護理之家住民便秘成效之研究

The Effectiveness of an Acupressure Program for Constipation in Nursing Home Residents

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摘 要：本研究旨在比較穴位按摩、腹部按摩及軟便劑使用對護理之家住民便秘改善之差異性。採實驗性前後測研究設計，研究對象爲二所護理之家近一個月每週排便次數少於 2 次住民，共計 90 名。採簡單隨機分派於兩組實驗組—「軟便劑使用+腹部按摩」組和「軟便劑使用+穴位按壓+腹部按摩」組及對照組—「軟便劑使用」組。收案當日以「便秘的定義性特徵評量表」評估住民便秘情形，並紀錄排便次數、糞便軟硬程度等，次日開始接受介入措施連續 10 天腹部及穴位按壓，每天觀察排便次數、糞便軟硬程度並記錄於「穴位按壓結果紀錄表」及「腹部按摩結果紀錄表」。EPI-INFO 及 SAS 統計軟體進行資料分析，採變異數、卡方檢定及重覆測量分析（Generalized Estimating Equations；GEE）。研究結果：以統計方式控制

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干擾因素，發現三組間並無顯著差異。研究結果雖未能顯示穴位按壓對便秘之成效，因水分、水果量及罹病種類等變項，以統計方法控制但仍是重要干擾變項。建議未來研究，研究設計上納入對干擾變項之控制。

關鍵詞：便秘、穴位按壓、老人、腹部按摩

Abstract: The purpose of this study is to compare the acupressure program with abdominal massage and laxatives for constipation in elderly nursing home residents. An experimental research design was conducted in two nursing homes in Hsinchu City, Taiwan, with ninety elderly (aged over sixty-five years) nursing home residents who experienced bowel openings less than twice a week.

Subjects were assigned to three groups randomly, one is control group (with laxatives only), and the other two are experimental groups (one with laxatives and abdominal massage and the other with laxatives, acupressure and abdominal massage). The research was performed over 10 days. A double blind (residents and assessors blind) and a randomized controlled study were applied for the research. Nursing home residents were unaware of the group to which they belonged. The assessor was unaware of the particular residents categorized for the experimental group. Each of the two intervention groups was compared with the control group. Constipation evaluation sheets were recorded daily for ten days. Observation of the frequency of defecation and the consistency, particularly firmness, of feces over each twenty-four hour period was recorded on the appropriate record sheets. Two researchers were trained in the process of abdominal massage and acupressure. Analysis was performed using EPI-INFO and SAS software for deviation, chi-square and a generalized estimating equation test. Research results showed: three variations as interference factors were turned out and there was no relevant evidence from each of the groups.

The research result does not demonstrate the effectiveness of acupressure as an intervention in constipation of elderly nursing home residents. The interference factors have been controlled although they may have been affected by fluid and fruit intake and different diseases suffered by participants. Further studies with strict control of the interference factors are needed.

Keywords: Constipation, Acupressure, Elderly, Sense, Abdominal Massage

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應用限制理論需求拉式庫存管理機制於啤酒遊戲之研究

A Study of Implementation of TOC Demand-Pull Inventory Management Mechanism in the Beer Game

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摘 要：長鞭效應 (Bullwhip Effect) 一直是供應鏈管理重要的議題，過去有許多研究探討長鞭效應的相關議題，其中 1960 年代 MIT Sloan 管理學院發展的啤酒遊戲即是用來驗證此效應存在的例子。然而傳統 MIT 啤酒遊戲僅能看到問題，卻無法提出解決方案，因此本研究試圖驗證在MIT啤酒遊戲情境下應用限制理論 (Theory of Constraints, TOC) 需求拉式 (Demand-pull) 庫存機制可有不錯績效，藉此提供一個不錯的庫存方法來解決長鞭效應所產生的問題。另外長鞭效應形成，除了學者提出的四個成因外，Dr. Goldratt 認爲另一個重要主因爲「調整目標庫存水位後，並沒有等增加的貨進來後再做檢視」。本研究透過模擬來進行驗證 Dr. Goldratt 之論點是否成立，最後針對 MIT 啤酒遊戲中不合理地方做延伸探討與分析。

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關鍵詞：啤酒遊戲、長鞭效應、限制理論、需求拉式

Abstract: Bullwhip effect has been an important issue in the supply chain management (SCM). The beer game, developed at the MIT Sloan School of Management in early 1960s, is a classic supply chain problem widely used in graduate business programs to teach the concepts of supply chain management. However, the traditional MIT Beer Game can barely emerge the problem, but not proposing a solution. This study attempts to provide a good way to solve inventory problems arising from the bullwhip effect by verifying the implementation of Theory of Constraints (TOC) Demand-pull mechanism can have better inventory performance in the MIT Beer Game. On the other hand, in addition to the four causes coming up with researcher, Dr. Goldratt thinks another major reason for the bullwhip effect is due to “After the adjusting of inventory target level, managers revise the level again without waiting for the increase quantities come in later.” This study used the simulation program to verify the Dr. Goldratt’s argument is substantiated. Finally, extended analysis against the inadequacy of the MIT Beer Game was also discussed.

Keywords: Beer Game, Bullwhip Effect, Theory of Constraints

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陳水扁的政治人格與終統政策宣示

The Political Personality of Shui-Bien Chen and the Declaration of Ceasing to Apply the Guidelines for National Unification

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摘 要：2006 年二二八紀念日的前夕，陳水扁總統宣佈「終止運作」國家統一委員會和國家統一綱領。陳水扁就任總統之後，國統綱領的存在，對陳水扁政府的大陸政策，幾無實質政策影響，但其對台海和平的維持，仍具有高度之象徵意義。宣示「終統」意味陳水扁總統企圖逐步毀去自己「四不一沒有」的承諾，將激怒中共，危及台灣安全與美國利益，對國家整體並無任何利益。本文假設「終統政策」並非一般兩岸關係研究途徑所能適當解釋，陳水扁的政治人格乃「終統政策」形成最重要關鍵，因此本文採取政治人格個案研究的途徑，分析下列問題：第一、究竟是甚麼人格特質導致他宣布此項政策？其次，「終統政策」宣布的政治環境與即刻情境爲何？第三，檢視政治過程，評估「終統政策」的政治影響。

關鍵詞：陳水扁、政治人格、國家統一綱領、即刻情境

Abstract: Before the 228 Memorial Day in 2006, President Shui-Bien Chen has declared to “cease to apply” the National Unification Council and the Guidelines for National Unification. The existence of the Guidelines for National Unification has no real effect on Shui-Bien Chen’s government’s policy on China. Yet, the Guidelines are still symbolic to the maintenance of cross-straits peace. The declaration means that President Shui-Bien Chen is gradually deviating himself from his promise of the “four no’s and one without”, and endangering the security of

Taiwan and benefits of the USA. This paper presupposes that President Shui-Bien Chen's political personality is the most important key in the formation of the the declaration. Therefore, this paper takes the examination of Chen's political personality as a way to study this case, and analyzes the following questions:

1. What personality of Chen have led him to declare the abovementioned policy?
2. In addition, what are the political environment and immediate circumstance of the declaration of the "policy against the unification with China"?
3. And finally, examine the political process and evaluate the political influence of the "policy against the unification with China".

Keywords: Shui-Bien Chen, Political Personality, Guidelines for National Unification, Immediate Circumstance