



UNIVERSITI SAINS MALAYSIA

Laporan Akhir Projek Penyelidikan Jangka Pendek

The Synthesis of Potential AntiCancer Octahedrally Coordinated Complexes of Copper, Nickel, Zinc, Cobalt, Vanadium, Palladium and Platinum and the Determination of their Interactions with DNA

by

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B. OBJECTIVES ACHIEVEMENT

- i) Original project objectives (please state the specific project objectives as described in the application form)

The synthesis of a broad series of novel mixed-ligand Cu (II), Ni(II), Zn(II), Co(II), V(IV), Pt(IV) and Pd(IV) diimine compounds with an extended ring ligand (Scheme 1) which will bind more strongly to the DNA will be carried out.

- ii) Objectives Achieved (Please state the extent to which the project objectives was achieved)

Complexes of Cu(II), Ni(II), Zn(II) Co(II) V(IV) and V(V) were synthesized, characterized and their interactions with DNA studied.

- iii) Objectives not achieved (Please identify the objectives that were not achieved and give reasons)

Complexes with Pt(IV) and Pd(IV) were not done due to cost constraint.

- C. **Assessment of Research Approach** (Please highlight the main steps actually performed and indicate any major departure from the planned approach or any difficulty encountered)

Syntheses and characterization of new transition metal complexes containing intercalating ligands will be carried out. X-ray structural studies will be carried out on single crystals of the synthesized complexes. The oxidation states of the metal will be determined by cyclic voltametry. Cleavage studies on circular plasmid DNA (pBR322) will be carried out by gel electrophoresis. Cytotoxicity tests with normal cell lines to determine if the observed toxicity is specific or selective.

- D. **Assessment of the Project Schedule** (Please make any relevant comment regarding the actual duration of the project and highlight any significant variation from plan)

As planned

- E. **Assessment of Project Costs** (Please comment on the appropriateness of the original budget and highlight any major departure from the planned budget)

Original budget appropriate

- F. **Benefits of the Project**

i. Technical contribution of the project :

a. What was the achieved direct output of the project :

Basic Research Project

Algorithm

Structure

Data

Other, please specify : _____

b. How would you characterize the quality of this output?

- Significant breakthrough
- Major Improvement
- Minor Improvement

ii. Contribution of the project to knowledge

a. How has the output of the project been documented?

- Detailed project report
- Product/process specification documents
- Other, please specify: _____

ii) How significant are citations of the results?

- Citations in national publications
- Citations in international publications
- None yet
- Not known

G. REPORTS, PAPERS AND PUBLICATIONS

i. List of reports and conference/seminar papers written:

'Characterization and Nucleolytic Property of oxo(pyridine-2,6-dicarboxylato)vanadium(IV) and Dioxo(pyridine-2-carboxylato)(pyridinium-2-carboxylato)vanadium(V)', S.G.Teoh and E.K. Lim, ESF-COST High-Level Research Conference on Inorganic Chemistry: Metal-Nucleic Acid interactions, Athens, November 12-17(2006).

'Characterization, Nucleolytic and Cytotoxic Property of Dioxo(pyridine-2-carboxylato)(pyridinium-2-carboxylato)vanadium(V) monohydrate and Sodium dioxo(diglycolato)vanadium(V) dihydrate', E.K. Lim and S.G. Teoh, 12th Asian Chemical Congress, Kuala Lumpur, August 23-25 (2007).

ii. List of scientific publications (including name(s) of co-author(s), date of publication, location and name of publisher. Please attach pre-print copies of the publications)

S.G Teoh, C.H. Ng, F.L. Tarn, E.K. Lim, S.M. Mansor, P. Balraj, L.C. Tai, B.M. Yamin and S.W. Ng 2008
Oxovanadium(IV) dipicolinate: structure, nucleolytic and anticancer property
Modern Applied Science **2**:117-126

E.K. Lim, **S.G. Teoh**, J.B.J. Teh, H.K. Fun and C.W. Yuen 2007
Tetrakis(μ -2,6-difluorobenzoato- κ^2 O, O')bis[aquacopper(II)]
Acta Cryst. E **63**, m991–m993

E.K. Lim, **S.G. Teoh** and B.M. Yamin. 2006
Dioxo(pyridine-2-carboxylato)(pyridinium-2-carboxylato)vanadium(V) monohydrate
Acta Cryst. E **62**: m207-m209

I. KEY PERFORMANCE INDICATORS ACHIEVEMENT

i) Scientific Knowledge Creation

No. of Publications (with impact factors)

(**Please list down all related publications since project started and attach the hardcopy)

No	Type of Publication	No. of publication/s	Title	Impact factor
1	Journal	2	<i>Acta Cryst. E63: m991–m993 (2007)</i>	0.2
	i) International [High impact or cited in Science Citation index (SCI) or Current Contents (CC)]		<i>Acta Cryst. E62: m207-m209 (2006)</i>	0.2
	ii) Local			
2	Papers (seminar/ conference/ workshop/Inaugural Lecture/Keynote)	1	ESF-COST High-Level Research Conference on Inorganic Chemistry: Metal-Nucleic Acid interactions, Athens, November 12-17(2006).	
	i) International			
	ii) Local	1	12th Asian Chemical Congress, Kuala Lumpur, August 23-25 (2007).	
3	Chapter in Scientific books/ Monographs			
	i) International			
	ii) Local			
4	Electronic Journal (Peer reviewed/ with impact factors)	1	<i>Modern Applied Science 2:117-126</i>	New Journal
	i) International			
	ii) Local			

ii) Technology Creation
(Relevant documents to be attached)

No	Technology creation	
1	Major scientific discoveries & new inventions	i) Anti cancer properties of V(IV) Complexes ii)
2	No. of patents filed	i) NIL ii)
3	No. of patents attained	i) NIL ii)
4	No. of technology platforms created and transferred	i) NIL ii)
5	No. of technology platforms acquired & applied	i) NIL ii)

J. ORGANISATIONAL OUTCOMES OF THE PROJECT ((Please describe as specifically as possible the organizational benefits arising from the project and provide an assessment of their significance)

i. Contribution of the project to expertise development

a. How did the project contribute to expertise?

PhD degrees How many: 2

MSc degrees How many: 2

Research staff with new specialty How many: _____

Other, please specify: _____

b. How significant is this expertise?

One of the key areas of priority for Malaysia
 An important area, but not a priority one

iv. Contribution of the project to the organization's reputation

a. How has the project contributed to increasing the reputation of the organization

- Recognition as a Center of Excellence
- National award
- International award
- Demand for advisory services
- Invitations to give speeches on conferences
- Visits from other organizations
- Other, please specify: Requests for collaborative research

b. How important is the project's contribution to the organization's reputation?

- Not significant
- Moderately significant
- Very significant

G) Human Capacity Building

i) No. of researchers in the team (since project started)

(Professor/Assoc. Prof./Lecturers (Dr.)/PhD student/Masters student/Research officer/Research Assistant)

Age and gender		No. of Researchers															
		<20		21-30		31-40		41-50		51-60		61-70		71-80		81-90	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1) Professor							1		1								
2) Assoc. Professor									1								
3) Lecturer (Dr.)																	
4) PhD students							2										
5) Masters student								2									
6) Research officer																	
6a) No. of PhD level =																	
6b) No. of Master's level =						1											
6c) No. of Undergraduate level =																	
6d) Others (please state [if any]) =																	
7) Research assistant																	
7a) No. of Undergraduate level =																	
7b) No. of diploma level =																	
7c) Others (please state [if any]) =																	

ii) Disciplines of researchers within team :

1) Inorganic Chemistry

2) Pharmacology

3) Medical Science

L.NATIONAL IMPACTS OF THE PROJECT

i. Contribution of the project to organizational linkages

a.. Which kinds of linkages did the project create?

- Domestic industry linkages
- International industry linkages
- Linkages with domestic research institutions, universities
- Linkages with international research institutions, universities

b. What is the nature of the linkages?

- Staff exchanges
- Inter-organizational project team
- Research contract with a commercial client
- Informal consultation
- Other, please specify: _____

ii. Social-economic contribution of the project

a. Who are the direct customer/beneficiaries of the project output?

Customers/beneficiaries:	Number:
Research Institutes	1
_____	_____
_____	_____

b. How has/will the socio-economic contribution of the project materialized?

- Improvements in health
- Improvements in safety
- Improvements in the environment
- Improvements in energy consumption/supply
- Improvements in international relations
- Other, please specify: Contribution to scientific knowledge

iii. How important is this socio-economic contribution?

- High social contribution
- Medium social contribution
- Low social contribution

iv. When has/will this social contribution materialized?

- Already materialized
- Within three years of project completion
- Expected in three years or more
- Unknown

Signature:

Ually

Date: 12 May 2008

Official Stamp:

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Endorsed by:

Research Management Centre

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