CHEMILINK
ZERO WASTE ENGINEERING

Chemilink Brand

- Green and Effective Engineering Solutions & Materials

凯密林克科技品牌

- 绿色高效的材料及工程实践

Chemilink Technologies Group, Singapore

凯密林克科技集团, 新加坡

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Cert No. 80091 Cert No. 90002

1. Corporate Position 公司定位

Philosophy 宗旨

Towards a zero solid waste society.
迈向无固体废弃物的优雅社会

Vision 愿景

The leading standard in Zero Waste Engineering.
引导零废弃物工程的潮流和标准

Mission 使命

To construct environmentally friendly and sustainable infrastructure by investing in zero waste businesses, creating zero waste processes, employing and developing people with zero waste mindsets.
通过投资零废弃业务,创造零废弃工艺并培养人们零废弃的思维模式，建造生态环保型的可持续发展的工程项目

Value Proposition 价值理念

Fast construction of cost effective, eco-friendly and durable infrastructure through very innovative and sustainable engineering solutions.
通过创新和可持续途径, 快速建造效益高,生态环保且耐久的基建工程

Corporate Values 企业价值观

Innovation & Passion, Process & Quality Driven, Integrity & Honesty.
创新精神和工作热情并举, 工艺和质量并进, 正直和诚实并存

2. Product Series 产品类别

--- We Provide Green & Effective Engineering Solution Comprising Supply of Engineering Compound and Provision of Technical Services ---

伴随着绿色高效的工程解决方案,
我们将提供对应的凯科系列产品及相关的技术服务……

2.1 Chemilink SS-100 Series for Civil/Road/Pavement Construction
凯科SS-100系列 - 土木/道路/路面工程

- **SS-108 series** — for Soil Stabilization/Rehabilitation/Recycling
  SS-108 子系列 — 土壤固化, 再生及循环使用
- **SS-110 series** — for Stone Stabilization/Rehabilitation and Recycling of Construction Wastes
  SS-110 子系列 — 碎石固化, 再生及建筑废料的循环使用
- **SS-120 series** — for Road Surface Quick Repairing
  SS-120 子系列 — 路面的快速修补
- **SS-130 series** — for Road Surfacing/Resurfacing
  SS-130 子系列 — 路面表层或磨耗层
- **SS-140 series** — for Semi-Rigid Pavement
  SS-140 子系列 — 半刚性路面

2.2 Chemilink SS-200 Series for Building Construction
凯科SS-200系列 - 房屋建筑工程

- **SS-210 series** — for Wall Finishing
  SS-210 子系列 — 墙面
- **SS-220 series** — for Floor/Car-park Surfacing
  SS-220 子系列 — 房屋地面和室内外停车场面层
- **SS-230 series** — for Concrete/Mortar's Repair/Bonding and Water-Plug
  SS-230 子系列 — 混凝土修补等
- **SS-240 series** — for Grouting
  SS-240 子系列 — 灌浆材料

- **SS-250 series** for Waterproofing (floor, roof, …)
  SS-250 子系列 防水材料
- **SS-260 series** for Tile-Adhesive
  SS-260 子系列 瓷砖粘结剂

2.3 Chemilink SS-300 Series for Solid Waste Management

凯科SS-300系列 - 固体废弃物处理

- **SS-310 series** for Slurry/Sludge Treatment
  SS-310 子系列 泥浆类的废物处理
- **SS-320 series** for IBA/IFA Treatment
  SS-320 子系列 垃圾焚化厂的底渣/灰的处理
- **SS-330 series** for Land Reclamation
  SS-330 子系列 填海及土地回填工程
- **SS-340 series** **f**or Landfill Liner & Capping
  SS-340 子系列 垃圾填埋场的安全隔离边界
- **SS-350 series** for Coal Binding
  SS-350 子系列 煤粉粘结剂

A Glimpse of Chemilink Singapore Central Plant

凯科新加坡中心工厂一角

3. Essences of Innovative Solutions 创新工程方案的精华摘要

--- Premier, Unique & Innovative Solutions to Address Civil Engineering's Challenges ---

首创, 独特和创新的解决方案以应对土木工程的各种挑战……

- ***"Floating" Semi-Rigid Platform*** over swampy and soft ground.
  (15-year highways/roads in swampy areas without major repairing)
  *软土/沼泽地基上的**半刚性"浮"平台***

- ***Anti-Cracking Performance*** for high-grade flexible pavements.
  (Examples: airport runways and taxiways with stabilized base & sub-base courses)
  高等级抗裂路面

- ***Excellent Workability*** for quick build and repair airport infrastructures under heavy operational limitations.
  (Iconic project: Singapore Changi International Airport runways widening, featured by Discovery Channel in "Man Made Marvels" program and broadcasted since 2008)
  *机场跑道等的**快速修建体系***

- ***Semi-Rigid Pavement*** with highest performances for heavy loading parks
  (Examples: airport parking aprons, heavy traffic roads and junctions in Singapore)
  *停机坪/重荷载交通的**半刚性路面***

- ***Reduce, Reuse & Recycle (3R)*** *local soils and solid construction wastes for various sustainable pavement construction*
  (Almost all Chemilink pavement projects internationally)
  ***3R-减少使用,废物利用和循环使用**土壤等当地材料资源及固体建筑废料以建设可持续发展的路面等基建项目*

4. Major Projects 重点工程项目

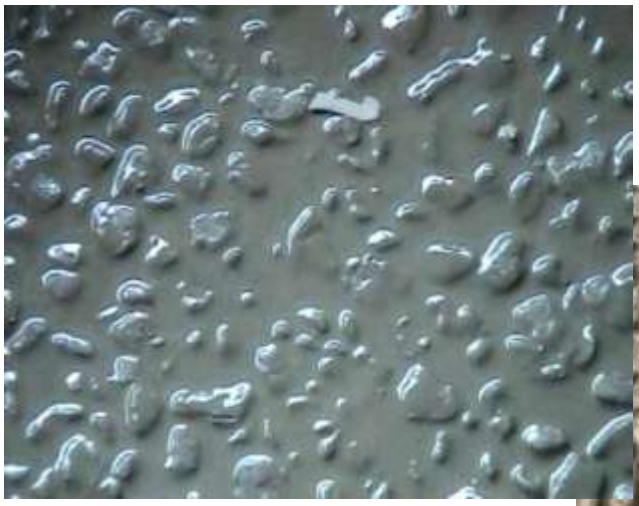
--- A Selection of Chemilink Projects for Past 20 Years
Is Testament of Our Superior Engineering Solutions ---
20年来凯科工程业绩见证了我们卓越的工程实践和成功……

Airfields 机场

- Singapore Changi International Airport Runway Widening (2005)
- Singapore Changi International Airport Parking Apron (2007)
- Malaysia Senai International Airport Runway & Taxiway Widening (2007 & 2008)

(An iconic project featured & broadcasted by Discovery Channel in "Man Made Marvels" Program worldwide since 2008)
这个凯科里程碑式的工程业绩自2008年起已由国际探索电视频道在其"人造奇迹"节目中向全球作了专题报道

Singapore Changi International Airport Runways Widening, 2005
新加坡樟宜国际机场跑道扩宽工程, 2005年



After Filling 灌浆后

After Hardening 硬化后

Singapore Changi International Airport Parking Apron, 2007
(A latest pavement solution)
新加坡樟宜国际机场停机坪 – 最新的半刚性路面技术, 2007年

Seaports 海港

- Indonesia Batamas Shipyard (1997)
- Malaysia Port Klang Container Yard (2010)

Port Klang Container Yard, Malaysia, 2010
(A typical "3R" project)
马来西亚巴生海港集装箱堆场 – 典型的"3R"工程,
2010年

Highways/Roads 高速公路及其它道路等

- Jalan Tutong Phases II &III, Brunei (1997&1999)
- Brunei City Road Maintenance (2000)
- China Low Cost Roads (e.g. Tibet Public Roads, 2002~2011)
- Caltex Oil Field Access, Indonesia (2002)
- South-East Asia Public Roads in Swampy Areas (2004)
- Sri Palani Murugan Industrial Growth Centre, India (2010)
- Heavy Traffic Junctions, Singapore (2010~2011)

Jalan Tutong, Phases II & III, Brunei, 1997&1999
(A durable "Floating" Semi-Rigid Platform in swampy areas)
文莱沼泽地区快速公路 - 耐久型半刚性"浮"平台的工程范例,
1997年/1999年

Road in Swampy Area, South East Asia , 2004
东南亚沼泽地区的道路, 2004年

Road in Tibet, China with Severe Cold & Circumpolar Latitude, 2007
中国西藏高原严寒条件下的道路, 2007年

Rural Road in South East Asia, 2005
东南亚乡村道路, 2005年

Singapore Heavy Traffic Junctions, 2010 – 2011
新加坡繁忙重载交通道路及路口, 2010-2011年

Buildings 房屋建筑

- Jiangyan Secondary School in Jiangsu, China (1999)
- Nanzhen Building in Shanghai, China (2000)
- Upgrading of Swimming Pool for Westin Stamford Hotel, Singapore (2000)
- NTU Hostel Redevelopment, Singapore (2001)
- Airport & Aviation Services in Colombo, Sri Lanka (2004)
- National Hospital in Colombo, Sri Lanka (2004)
- Kuala Belait Hospital in Brunei (2004)
- Reconstruct of Maktab Sains College, Jalan Muara Phase II, Brunei (2004)
- Waterproofing for Superior Court in Colombo, Sri Lanka, (2006)
- The Sail at Marina Bay, Singapore (2007)
- Singapore HDB Aprons (2007~2011)
- Multi-Storey Car Park at Chin Swee Road, Singapore (2011)

Upgrading of Swimming Pool for Westin Stamford Hotel Singapore, 2000
新加坡威信史丹福酒店游泳池翻新工程, 2000年

Flooring System for The Sail at Marina Bay, Singapore, 2007
新加坡滨海湾启航大厦地板系统, 2007年



Singapore HDB Aprons, 2007~2011
新加坡国家建屋发展局地面系统, 2007-2011年

Multi-Storey Car Park at
Chin Swee Road, Singapore, 2011
新加坡振瑞路多层公共停车场路面, 2011年

R&D Projects for Solid Waste Management

(Awarded & Funded by Singapore Government)

新加坡政府授予和资助的固体废弃物处理类的研究发展项目

- ETRP - Environment Technology Research Program with NEWRI of NTU (2009)
  与南洋理工大学环境与水源研究院合作的环境科技研发项目, 2009年
- IES - Innovation for Environmental Sustainability (2010)
  凯科独自承担的环境可持续发展革新科技研发项目, 2010年

Geotechnical Lab
岩土实验室

Environmental Lab
环境实验室

Material Lab
材料实验室

Landfill Site Visit
垃圾填埋场实地访问

Chemilink R&D Center
凯科集团研发中心

Chemical Lab
化学实验室

R&D Project – ETRP 环境科技研发项目

NANYANG TECHNOLOGICAL UNIVERSITY

Nanyang Environment & Water Research Institute

CHEMILINK ZERO WASTE ENGINEERING

ENHANCED BIOLOGICAL AND PHYSICAL STABILIZATION IN LANDFILLS

Project Scope

Objectives

The target of the project is to develop a method for accelerated landfill stabilization, and to transform the landfill into a source of energy and a site for carbon sequestration. The developed method may be test-bedded at one of Singapore's landfill sites.

Brief Background

Landfilling is expected to be the most commonly employed waste disposal method worldwide since it is seemingly simple and economical. Poorly designed and operated landfills can, however, compromise human health and environmental quality with uncontrolled emissions of gas and leachate.

Even when properly operated, sanitary landfills can still potentially cause environmental difficulties because the natural decomposition process occurring within these landfills is slow and hence a long period of time is needed for stabilization. Given their widespread application and large land footprint, the environmental impacts from landfills may last for decades and likely into centuries. Nevertheless it is noted that the waste materials in the landfill are typically high in carbonaceous content – i.e. a potential source of energy.

Description

The project seeks to mitigate the impact of a landfill site by using novel techniques to recover biogas through enhanced biological means by controlling the acidogenic and methanogenic microbial consortia and to sequest carbon dioxide (CO_2) which is produced during the process. To enhance the biogas recovery, the completed landfill cells shall be operated with bias towards acidogenesis. The generated fatty acids is then extracted to produce methane (CH_4) and CO_2 under methanogenesis condition. CO_2 is harvested and converted into polysaccharides with microbial intervention.

Illustration of sanitary landfill structure

The project also seeks to address another potential solid waste management challenge faced by Singapore which is the disposal of incineration ash. The ash can, however, possibly have pozzolanic activity and it may be compatible with a carefully selected membrane liner material for the landfill. The project will look into the development of a landfill membrane material incorporated with incineration ash and hence address the issue of ash disposal.

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Managing Director / CEO
Chemilink Technologies Group

AEBC-NEWRI is a member of the NEWRI Ecosystem; Chemilink Technologies Group is a subsidiary of Chemilink International Holdings.

Contributions to Singapore's Environmental Sustainability

The project outcomes allow for an enhanced solid waste management system based on the developed landfill technique and also provides a useful application for incineration ash. The accelerated stabilisation of closed landfills would enable early return of the land for other useful applications. The enhanced biological process converts the landfill into a source of energy and such waste to energy effort represents resource reclamation. The conversion of CO_2 into polysaccharides to be used as landfill binder represents a method for carbon sequestration. A business model which can arise from the preceding would include landfill construction or remediation, landfill operation, energy recovery, carbon sequestration technology and higher value use of the remediated landfill site because of better ground condition.

Key Deliverables

- Operating protocol for fatty acids production.
- Enhanced methane and polysaccharides production process.
- An engineered system based on the above.
- Membrane liner formulation.
- Construction method for utilization of the membrane liner.

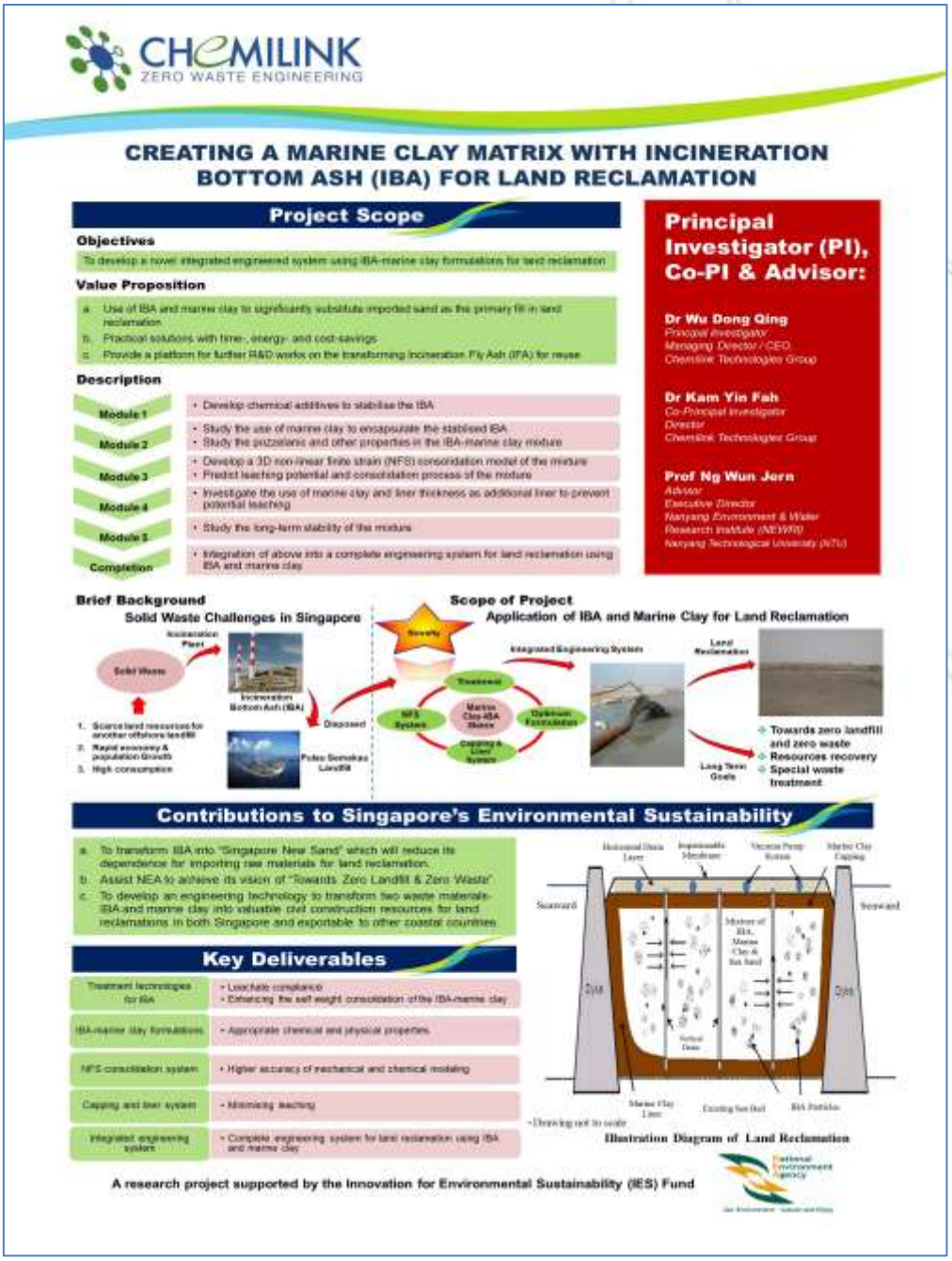
A research project supported by the Environment Technology Research Programme (ETRP)

Ministry of the Environment and Water Resources

Environment Technology Research Program with NEWRI of NTU, 2009

与南洋理工大学合作的环境科技研发项目, 2009年

R&D Project – IES 环境可持续发展革新科技研发项目



Innovation for Environmental Sustainability, 2010
环境可持续发展革新科技研发项目, 2010年

5. Customer Services 客户服务

1) Green and effective materials & products
提供绿色和高品质的材料与产品

2) Sustainable R&D / Project R&D with Customization and Localization
可持续的研发和客户化与当地化的项目研发相结合

3) Consultancy services including Pavement Design, Material Design and Construction Design
路面设计, 材料设计和施工设计

4) Project Management (for SS-100 series)
SS-100系列相关的工程项目管理
a. Construction Management 施工管理
b. Quality Control 质量监控
c. Site Supervision 现场施工指导

6. International Market of Projects / R&D Works 国际市场

(Asian countries mainly including South-East Asia, North-East Asia, South Asia and Middle-East Region; Australia and Pan-Pacific Region; Europe like UK; some of Africa; and America like Brazil & USA)

主要在东南亚, 大中华经济圈, 南亚, 中东等亚洲国家和地区; 澳洲; 英国等欧洲国家;非洲国家; 以及巴西和美国等美洲国家.

International Market Network

国际市场网络



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