
UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF
CHEMICAL & BIOENGINEERING TECHNOLOGY

Universiti Kuala Lumpur
Where Knowledge is Applied

UniKL Physical Footprint

UniKL Campuses, Associate Colleges and Capacity

1	UniKL MSI, Kulim	1,500 (1,187)
2	UniKL MIMET, Lumut	1,500 (1,268)
3	UniKL RCMP, Ipoh	1,500 (1,754)
4	UniKL BMI, Gombak	2,000 (1,905)
5	UniKL MIIT, KL	2,500 (2,423)
6	UBIS, KL	2,500 (2,861)
7	UniKL MIDI, Cheras	1,000 (807)
8	UniKL MFI, Bangi	2,000 (2,163)
9	UniKL MESTECH, Kajang	1,000 (746)
10	UniKL MIAT, Sepang/Subang	2,500 (2,782)
11	UniKL MICET, Alor Gajah	1,500 (1,419)
12	UniKL MITEC, Pasir Gudang	1,500 (1,577)

Universiti Kuala Lumpur
Where Knowledge is Applied

UniKL Physical Footprint

UniKL Campuses, Associate Colleges and Capacity

UniKL MIMET
Marine Engineering Technology

UniKL MIAT
Aviation and Aircraft Maintenance Technology

Electrical, Electronics and Telecommunication Technology
UniKL BMI

UniKL MESTECH
Medical Science Technology

Industrial Maintenance and Automation Technology
UniKL MFI

UniKL RCMP
Medical and Allied Health Sciences

Automotive Components and System Technology
UniKL MSI

UniKL BIS
Accounting, Entrepreneurship and Islamic Finance

Chemical and Bioengineering Technology
UniKL MICET

UniKL MITEC
Quality Engineering and Industrial Logistics

Product Design and Manufacturing Technology
UniKL IPROM

Information Technology, Multimedia and Animation
UNIKL MIIT

Organization Chart

Dean / Head of Campus
AP Dr Ruzainah bt Ali @ Jaafar

Head of Research & Innovation
AP Dr Norzahir Sapawe

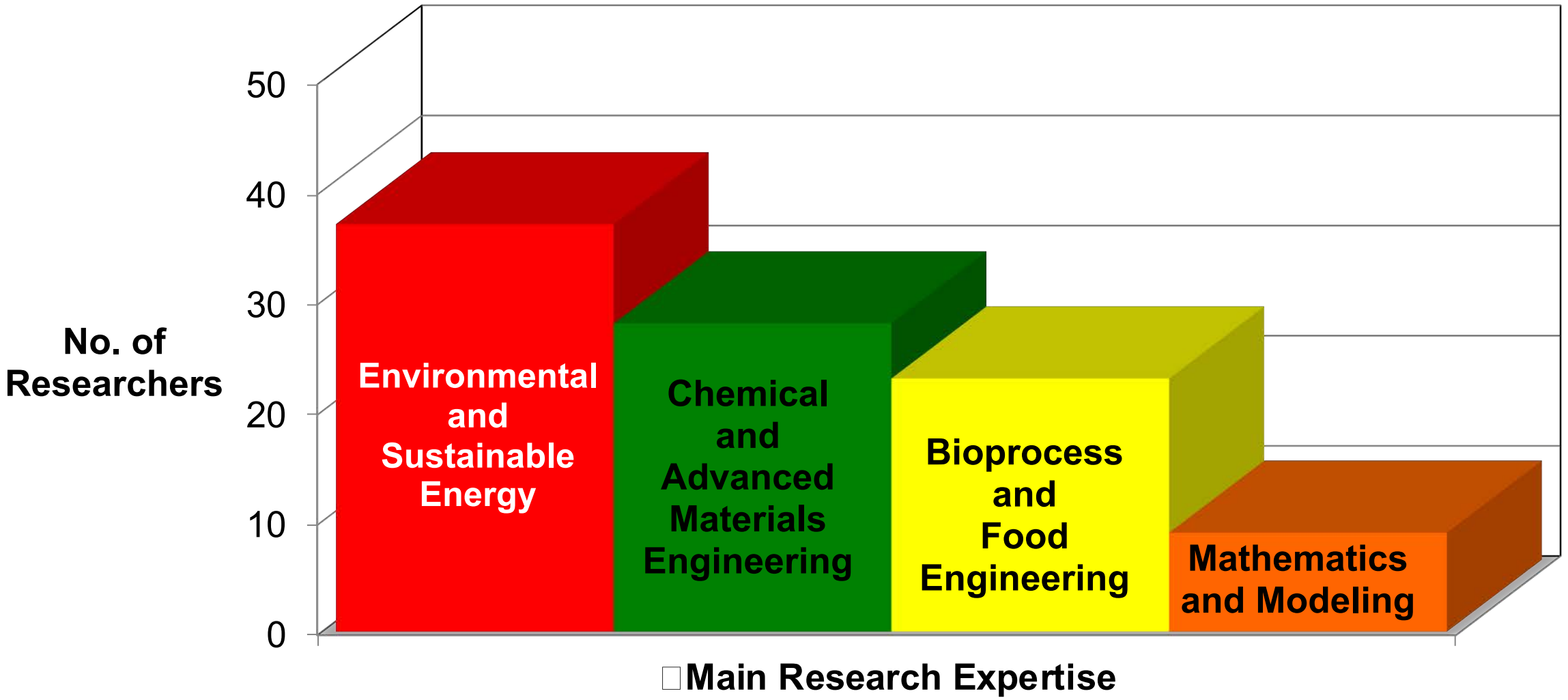
Head of Postgraduate
AP Dr Suzana Wahidin

Coordinator (Research)
Dr Tong Woei Yenn

Coordinator (Innovation)
Dr Mohd Razealy Anuar

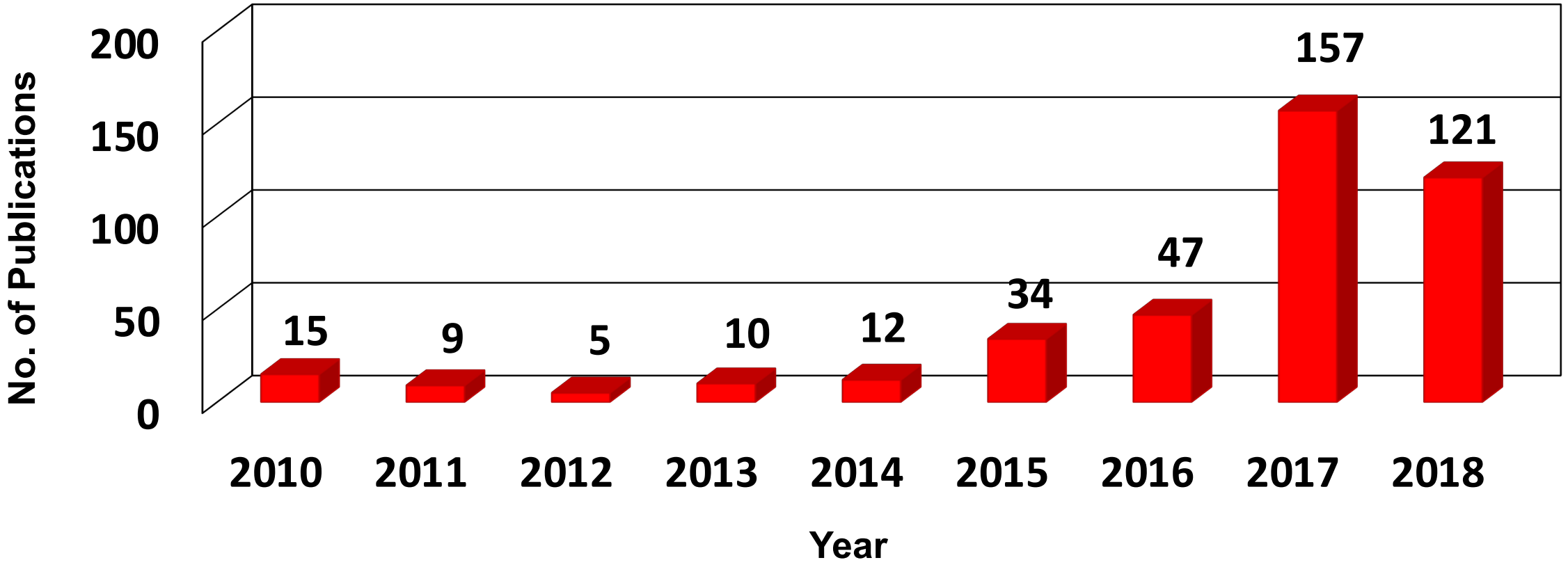
Coordinator (FYP)
Dr Khairul Faizal Paée

Our Expertise

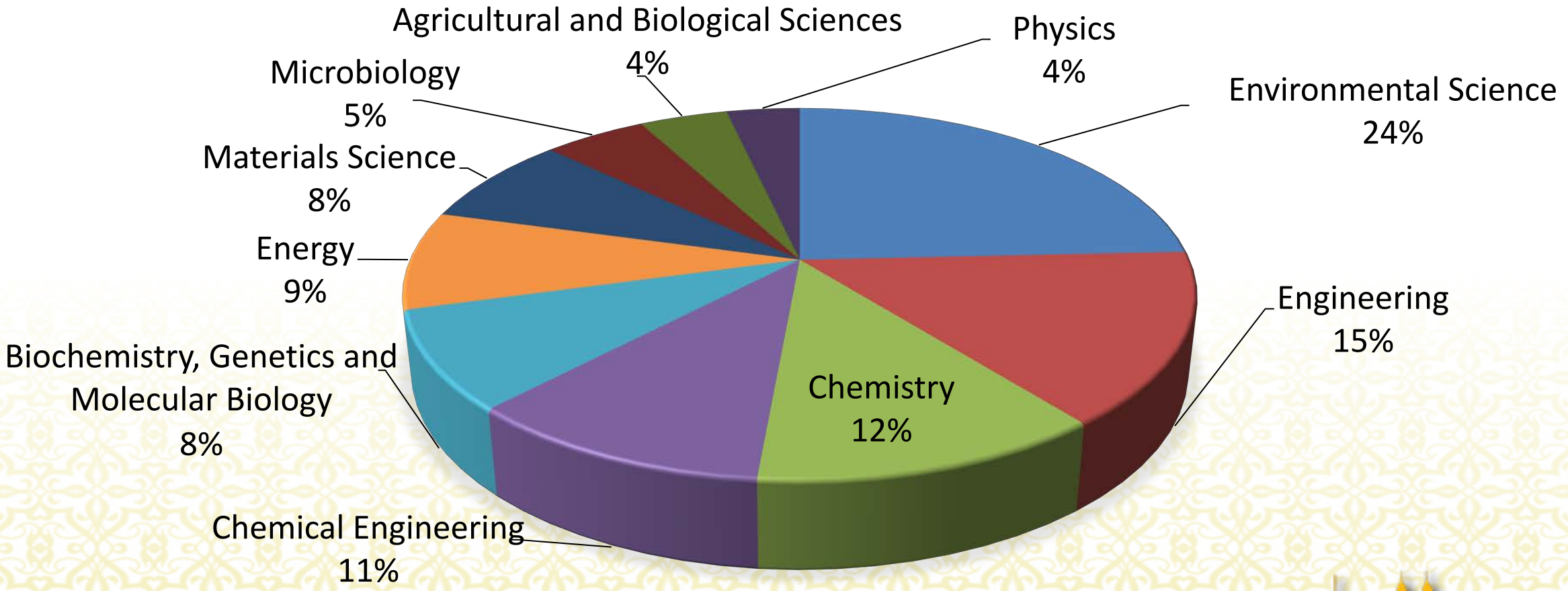


Our Publications

ISI/SCOPUS Index Publication 2010-2018

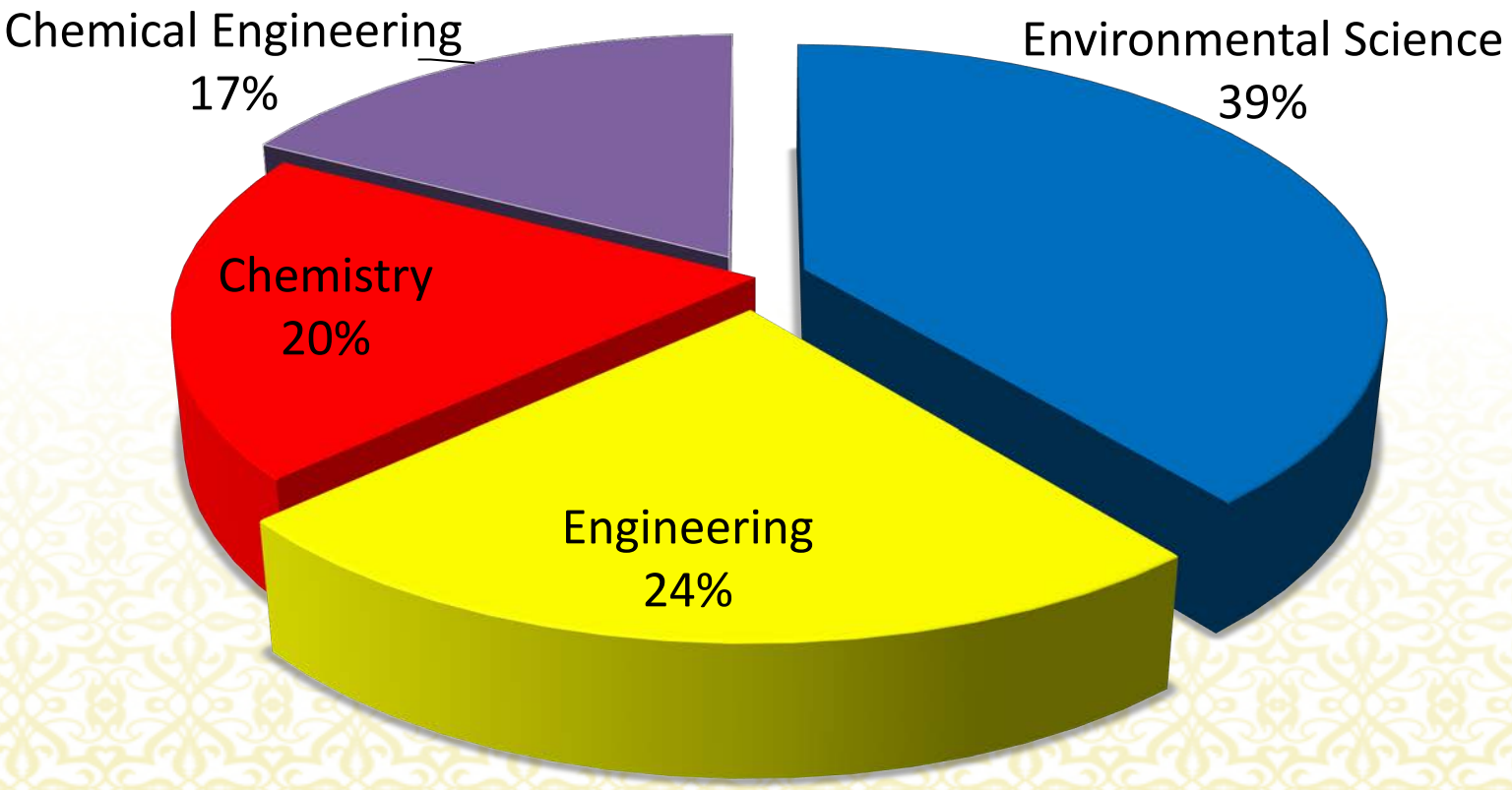


Our Publications



Publications categorized based on the main research expertise

Research Grants

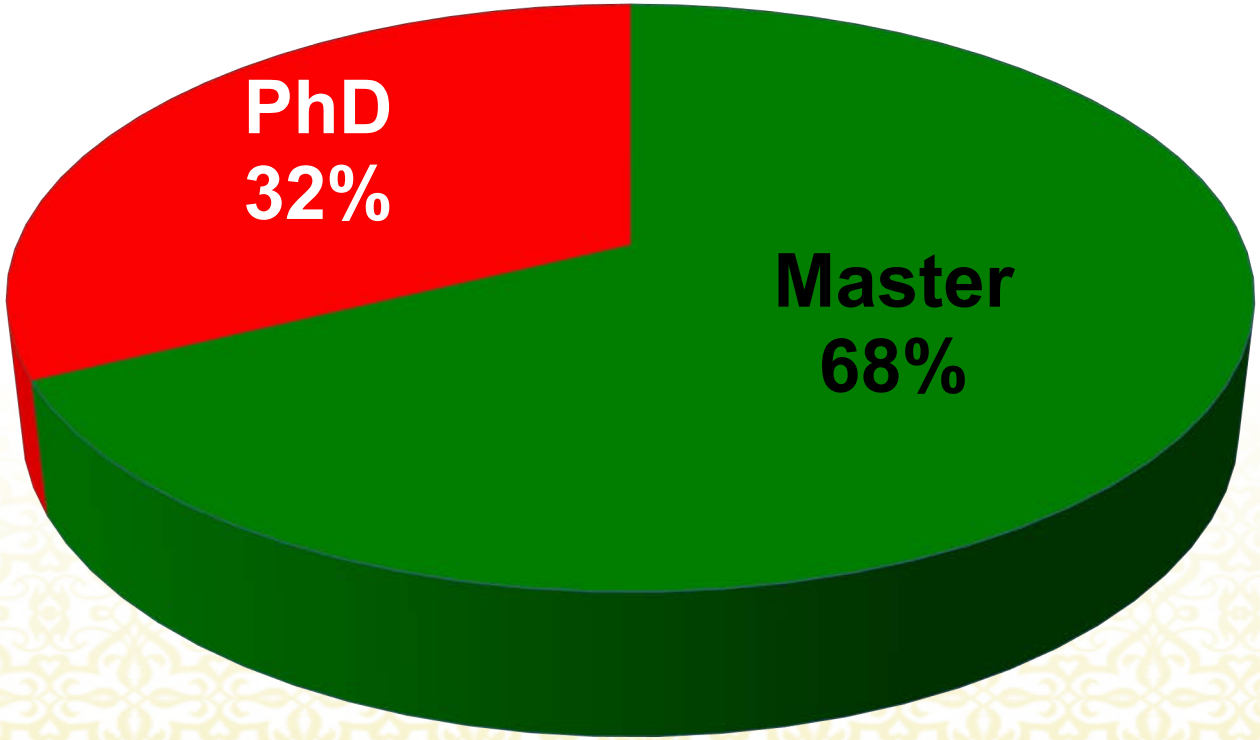


YEAR	AMOUNT (RM)
2015	313K
2016	390K
2017	796K
2018	1047K

Grants

SGPIM	MTSF
STRG	ICGEB
FRGS	Industry
PPRN	

Postgraduate Students



Masters	66 students
PhD	30 students

Program Offered:

1. Master of Engineering Technology (Chemical Engineering)
2. PhD in Engineering Technology (Chemical Engineering)

Research Clusters

GREEN CHEMISTRY
33 SCOPUS PUBLICATIONS | TOTAL GRANTS: RM162,500

BIOMATERIALS
30 SCOPUS PUBLICATIONS | TOTAL GRANTS: RM59,960

BIOENGINEERING
27 SCOPUS PUBLICATIONS | TOTAL GRANTS: RM101,000

Green Chemistry Cluster

Conduct innovative research following to the **GREEN CHEMISTRY** concept related to the Malaysian industrial demand and by complying with the guidelines of the Department of Environment (DoE), Malaysia legislation to reduce

- Waste generation,
- Wastewater generation
- Minimize the used chemical
- Hazard
- Cost

- ✓ Using Renewable Materials
- ✓ Utilizing Green Technology
- ✓ Reuse/Recycle of the Chemicals

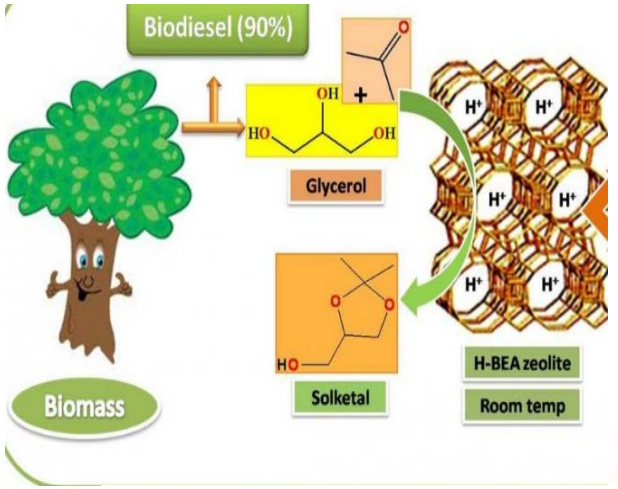
Green Chemistry Cluster

1. Environmentally benign chemical synthesis and processes: Green catalysis, green solvents and reagents, synthetic methods etc.

2. Green energy from renewable resources:
   biofuel, bio-hydrogen, bio-diesel production from agricultural biomass, food waste and agro-industrial biomass.

3. Green chemical engineering processes:
   bio-sensor, waste minimization, efficient separation processes, wastewater treatment.

4. Green technologies for environmental sustainability:
   hazardous waste and harmful chemicals treatment, pollution prevention, environmental redemption, zero waste technology.



Cluster Members

Member
Dr. Mohd Zulkhairi Abdul Rahman

Member
Dr. Nor Nadiah Mohamad Yusof

Member
Asimi Ana binti Ahmad

Member
Haniza Binti Kahar

Member
Lily Suhaila Binti Yacob

Member
Dr. Kelly Yong Tau Len

Member
Dr. Amelia Md Som

Member
Assoc Prof Dr. Abbas F. Mubarek Al-Karkhi

Member
Dr. Wan Noor Aidawati Wan Nadhari

Member
Dr. Norzahir Sapawe

Member
Dr. Mohammed Danish

Member
Mr. Edyazuan Azni

Member
Prof. Dato' Dr Azanam Shah Hashim

Member
Assoc. Prof. Dr Ahmad Marzio Mohd Yusoff

Member
Assoc. Prof. Dr Ong Siew Kooi

Member
YM Dr Raja Nazrul Hakim Raja Nazrin

Member
Dr Noor Faizah Che Harun

Member
Dr Yusriah Lazim

Member
Dr Muzafar Zulkifli

Member
Ms. Mazlina Gahzali

Polymer Research Members

Affiliated Members

Affiliated Member
Prof. Dr. Samuel B. Adeloju
School of Chemistry
Monash University, Australia

Affiliated Member
Dr. AHmad Jaril Asis
Sime Darby Research Sdn Bhd

Affiliated Member
Prof. Ir. Dr. Mohd Omar Ab Kadir
Universiti Sains Malaysia

Affiliated Member
Prof. Dr. Mohd. Rashid Mohd. Yusof

Collaborations (Polymer)

PARTNER	TYPE OF COLLABORATION	EXPIRY DATE	REMARKS
Ansell	University-Industry Linkages	Jul-21	NDA
Malaysian Rubber Export Promotion Council	University-Industry Linkages	Sep-20	MoA (PGRT)
Malaysian Rubber Board	Human Capital Development (Training/Education) R&D, Consultancy & Commercialization	Feb-22	NDA (PhD & FYP)
Kilang Sawit Meru, Klang	Research Collaboration	-	Collecting samples for research
Tan Sin Lian Industries Sdn Bhd	Research Collaboration	-	Collecting samples for research
JPS Partners/ RICS Sdn. Bhd.	Research Collaboration	-	FYP

Analysis on Cure Behaviour via Arrhenius Equation

Findings on Effect of Carbon Black Structure

Carbon Black	N326 (Low Structure)	N330 (Medium Structure)	N339 (High Structure)
t_{90} (minutes)	8.37	8.98	9.85
t_{s2} (minutes)	2.22	2.06	2.40
TS (MPa)	17.64	18.75	19.61
EB (%)	1702.56	1505.69	1455.02
M100 (MPa)	0.80	0.86	0.89
M300 (MPa)	1.90	2.13	2.40
Hardness (Shore A)	51.9	53.9	54.7
Abrasion Resistance (% wt loss)	0.43	0.26	0.23

Carbon black structure affects t_{s2} & t_{90}

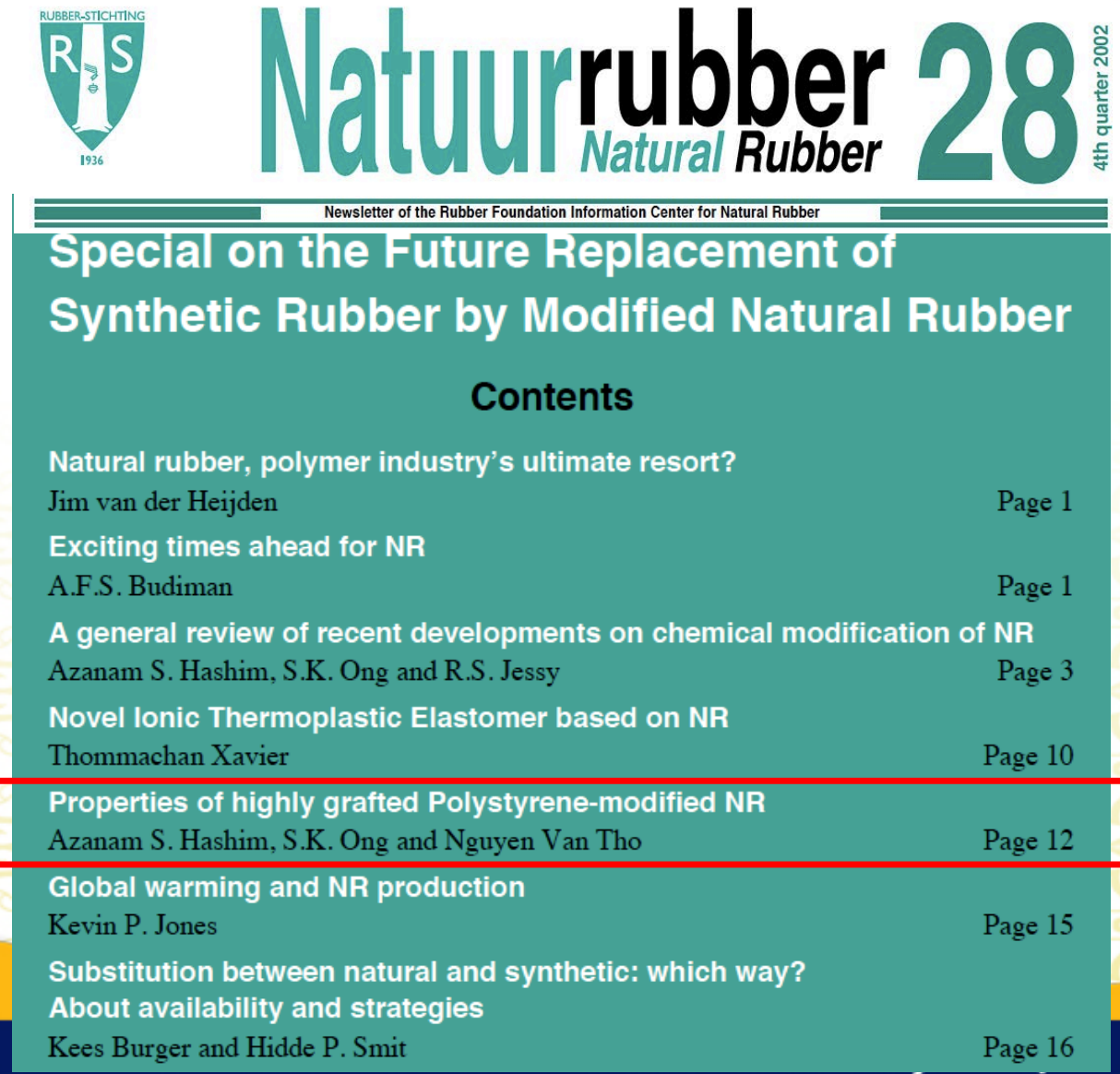
No data on correlation of carbon black structure on the optimum cure time

Potential research:

Effect of Carbon Black Structure on the Cure Behaviour of Filled NR Vulcanizates via Arrhenius Equation

Universiti Kuala Lumpur
Where Knowledge is Applied

Modified Natural Rubber



Findings on Modified Natural Rubber (Uncured)

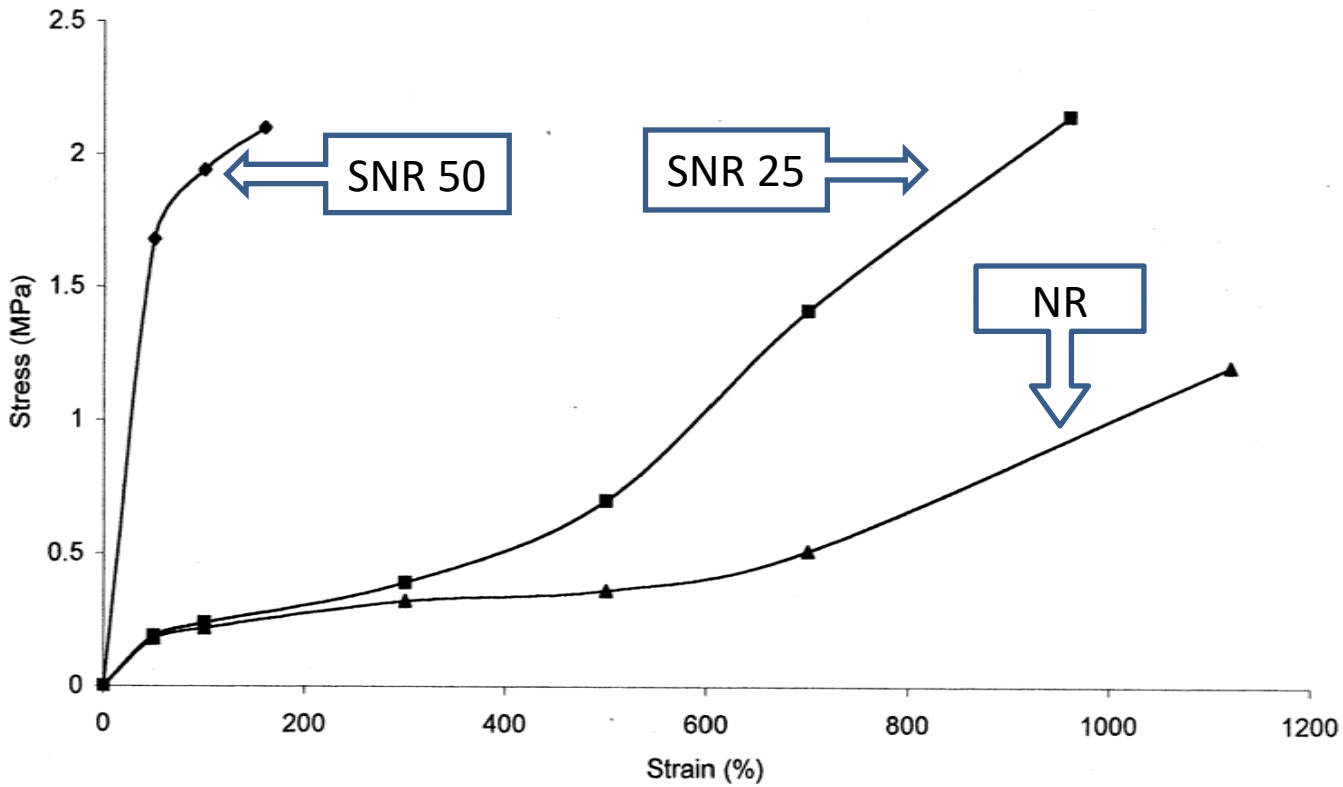
	SNR 25	SNR 50	NR
Styrene: Rubber (wt)	25: 75	50: 50	N/A
Actual of PS grafted (wt)	20.0	13.2	N/A
PS grafted: rubber (mole)	0.19: 1.10 (1.0: 5.7)	0.09: 0.74 (1.0: 5.9)	N/A
Tg of NR (°C)	-63.5	-61.5	-64.3
Tg of PS (°C)	106	91.5	N/A
Intermediate Tg (°C)	65.5	-	N/A
M100 (MPa)	0.25	1.94	0.24
M300 (MPa)	0.40	-	0.32
TS (MPa)	2.14	2.10	1.20
EB (%)	980	160	1120

Modified Natural Rubber

Findings on Modified Natural Rubber (Gum Vulcanizates)

	SNR 25	SNR 50	NR
t_{s2} (min)	11.1	13	10.2
t_{90} (min)	17	19	15.5
$T_{max} - T_{min}$ (dNm)	4.6	3.2	4.9
M100 (MPa)	0.9	7.2	0.5
M300 (MPa)	3.1	-	1.1
TS (MPa)	18.1	8.6	18.3
EB (%)	780	160	1090
Tear Strength (kgf/cm)	23.9	61.3	34.7

Recipe: 100 phr rubber; 5.0 phr Zinc Oxide; 2.0 phr stearic acid; 2.0 phr IPPD; 1.5 phr MBTS; 1.5 phr Sulphur



Natural Coagulant in Water Treatment

Findings on Water treatment using Natural Coagulant

Process Biochemistry 51 (2016) 1085–1091

Contents lists available at ScienceDirect

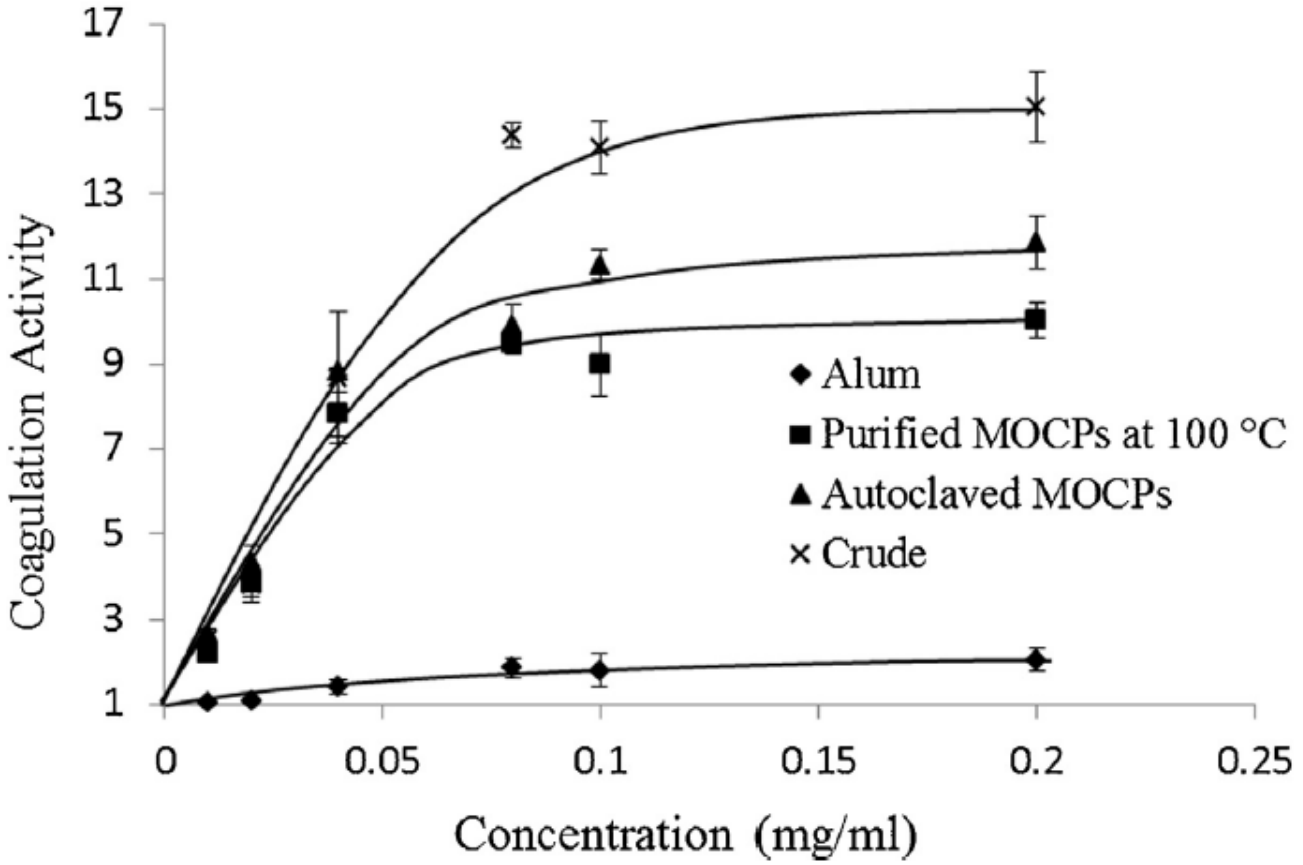
Process Biochemistry

journal homepage: www.elsevier.com/locate/procbio

A simplified method for the purification of an intrinsically disordered coagulant protein from defatted *Moringa oleifera* seeds

Seyedehsara M. Dezfooli [a,*], Vladimir N. Uversky [b,c], Mussarat Saleem [a], Farah Salma Baharudin [a], Sharifah M. Sayed Hitam [a], Robert T. Bachmann [a,*]

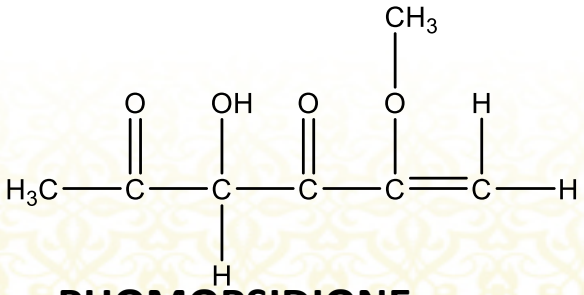
[a] Malaysian Institute of Chemical and Bioengineering Technology (MICET), Universiti Kuala Lumpur, Lot 1988, Taboh Naning, 78000 Alor Gajah, Malaysia
[b] Department of Molecular Medicine, USFHealth Byrd Alzheimer's Research Institute, Morsani College of Medicine, University of South Florida, Tampa, FL 33612, USA
[c] Biology Department, Faculty of Science, KingAbdulaziz University, P.O. Box 80203, Jeddah21589, Saudi Arabia



Anti-*Candida* activity of Phomopsidione

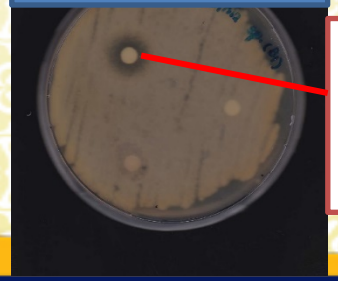
Tong et al. (2017)
Journal of Microbiology and Biotechnology

- A novel compound isolated from the leaf of medicinal herb *Orthosiphon stamineus* Benth.
- Exhibited significant antimicrobial and anti-inflammatory activity.

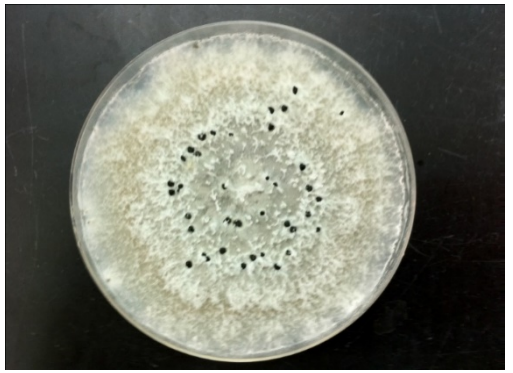


PHOMOPSIDIONE
(5-hydroxy-5-methoxyhex-5-ene-2,4-dione**)**

C. albicans



Formation of clear zone indicates inhibition of bacterial growth.

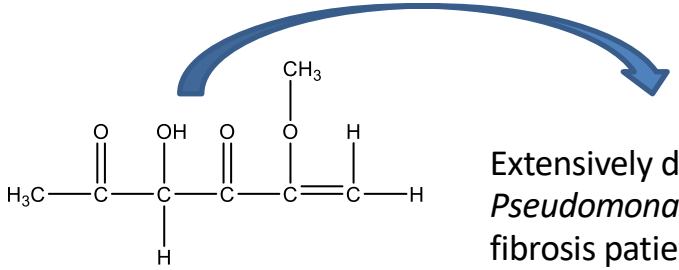


Diaporthe sp. ED2

TABLE 1: Inhibitory activity of phomopsidione on clinical isolate of *C. albicans.*

Test substance	**Antimicrobial efficiency *on* *C. albicans***		
	Diameter of clear zone (mm)	**MIC (µg/ml)**	**MFC (µg/ml)**
Phomopsidione	14.7 ± 0.8	3.1	12.5
Fluconazole	9.4 ± 0.6	25	50
Voriconazole	14.2 ± 0.6	12.5	25

Phomopsidione inhibits Gram negative bacteria



Phomopsidione

Extensively drug resistant (XDR) *Pseudomonas aeruginosa* from cystic fibrosis patient

Test Compound	Minimal inhibitory concentration (µg/ml)	Minimal bactericidal concentration (µg/ml)
Phomopsidione	25	50
Polymyxin E	15	35
Gentamicin	Resistant	
Piperacillin	Resistant	
Ticarcilin	Resistant	

OUR FINDINGS:

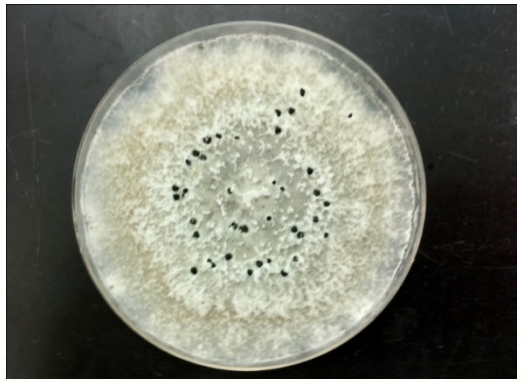
- The compound also exhibited significant antimicrobial activity on several Gram negative bacteria such as *Klebsiella*, *Escherichia*, *Pseudomonas* and *Acinetobacter*.
- Phomopsidione has low toxicity (50% lethal dose [LD_{50}] of 1,611 mg/kg of body weight/day).

MODE OF ACTION ???

Phomopsidione Nanoparticles Coated Contact Lenses Reduce Microbial Keratitis Causing Pathogens

Microbial keratitis

- Infection occurs among contact lens wearers
- Severe infection can cause blindness



Diaporthe flaxinii ED2

Experimental Eye Research 178 (2019) 10–14

Contents lists available at ScienceDirect

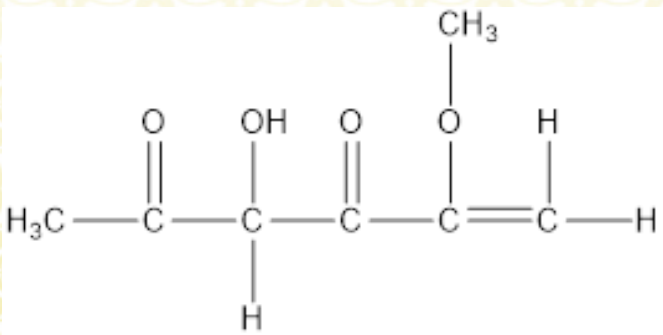
Experimental Eye Research

journal homepage: www.elsevier.com/locate/yexer

Phomopsidione nanoparticles coated contact lenses reduce microbial keratitis causing pathogens

Muhammad Yusoff Bin Sahadan[a], Woei Yenn Tong[a,*], Wen Nee Tan[b], Chean Ring Leong[a], Mohamad Najib Bin Misri[c], Murphy Chan[d,e], See Yuan Cheng[f], Shahrulzaman Shaharuddin[a]

[a] Universiti Kuala Lumpur, Malaysian Institute of Chemical and Engineering Technology, Lot 1988 Kawasan Perindustrian Bandar Vendor, Taboh Naning, 78000, Alor Gajah, Melaka, Malaysia
[b] School of Distance Education, Universiti Sains Malaysia, 11800, Gelugor, Pulau Pinang, Malaysia
[c] Massey University, Palmerston North, Auckland, Wellington, New Zealand
[d] Management Science University, University Drive, Off Persiaran Olahraga, 40100, Shah Alam, Selangor, Malaysia
[e] Eyecon Optometri, G10 Bangunan Kings Hotel, Lebuh Ayer Keroh, 75450, Melaka, Malaysia
[f] Faculty of Mechanical Engineering, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100, Durian Tunggal, Melaka, Malaysia



Phomopsidione

Infection can be prevented by coating antimicrobial agent on contact lenses.

Universiti Kuala Lumpur
Where Knowledge is Applied

Phomopsidione Nanoparticles Coated Contact Lenses Reduce Microbial Keratitis Causing Pathogens

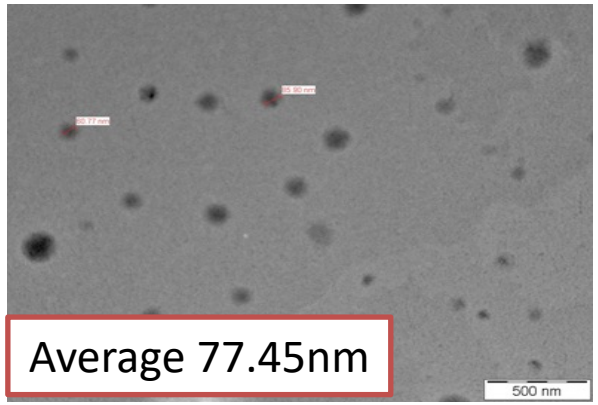


Figure 1: TEM micrograph of phomopsidione nanoparticle.

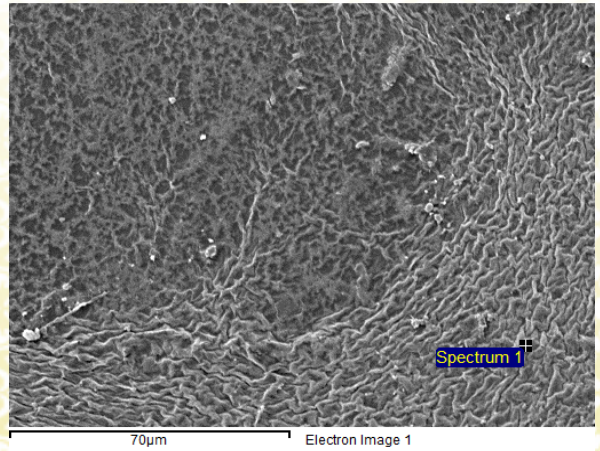


Figure 2: SEM micrograph of contact lens coated with phomopsidione nanoparticles.

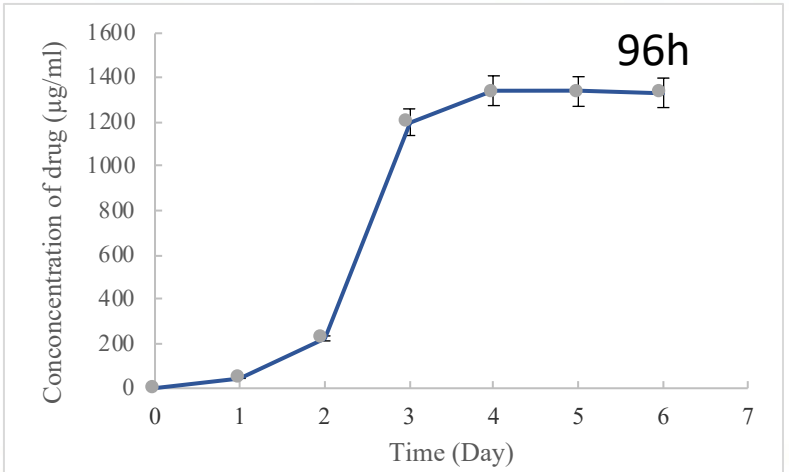


Figure 3: The drug release behaviour of phomopsidione from the nanoparticles.

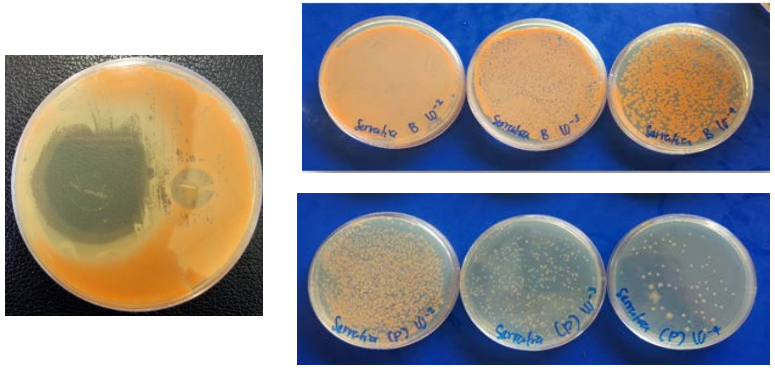
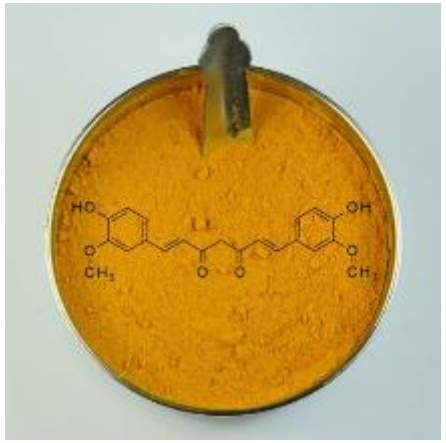


Figure 4: Inhibition on *S. marcescens*.

Table 1: Antimicrobial activity of phomopsidione-NP coated lenses on keratitis –causing microorganisms.

Test microorganisms	Diameter of clear zone (mm)		% of growth reduction
	Lens with P-NP	Control	
S. marcescens	41.6 ± 3.2	-	99.9
P. aeruginosa	51.3 ± 2.9	-	99.9
MRSA	24.0 ± 4.0	-	99.34
P. mirabilis	-	-	-
C. utilis	-	-	-

Antimicrobial Wound Dressing Film Utilizing Cellulose Nanocrystal as Drug Delivery System for Curcumin



- Curcumin is the active constituent of the Indian spice turmeric.
- Multi-functional compounds with anti-bacterial properties

<u>Limitation of curcumin</u>

Low solubility in aqueous solution
Low bioavailability
Rapid degradation

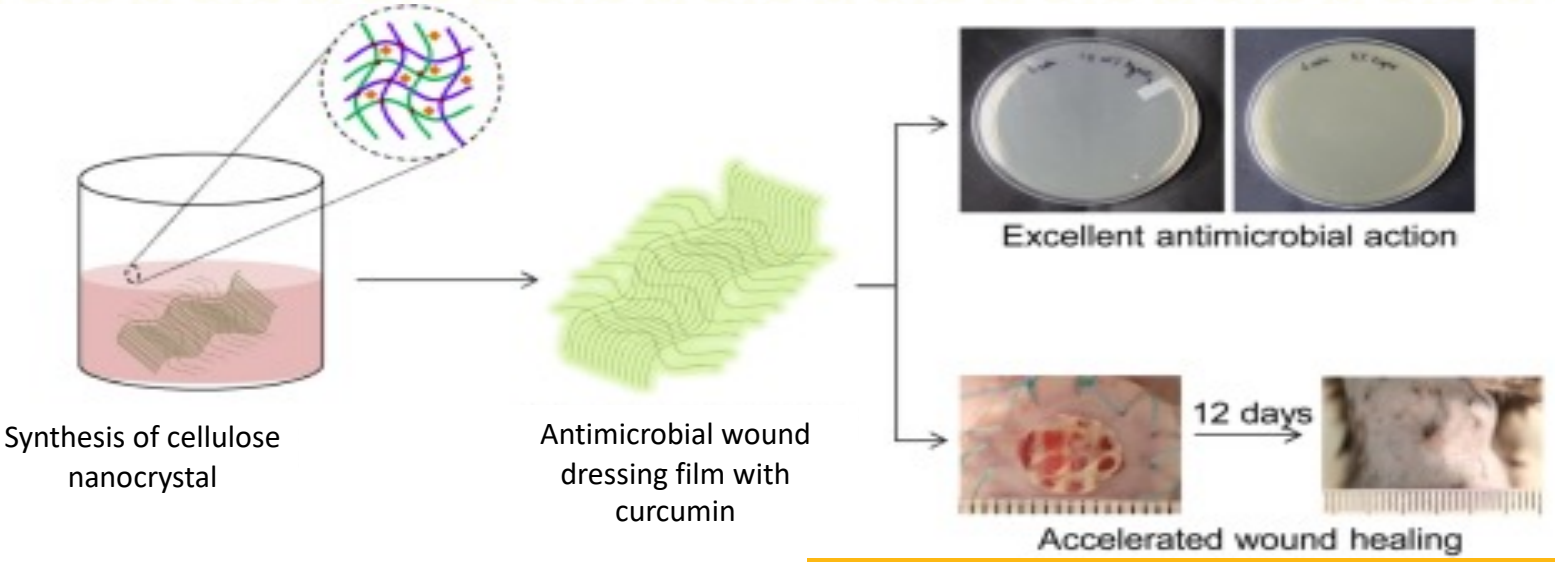
Cellulose
DOI 10.1007/s10570-017-1562-9

ORIGINAL PAPER

Antimicrobial wound dressing film utilizing cellulose nanocrystal as drug delivery system for curcumin

Woei Yenn Tong · Ahmad Yassin Kamari bin Abdullah · Nur Amiera Syuhada binti Rozman · Muhamad Izul Aimin bin Wahid · Md. Sohrab Hossain · Leong Chean Ring · Yusriah Lazim · Wen-Nee Tan

The research idea



Antimicrobial Wound Dressing Film Utilizing Cellulose Nanocrystal as Drug Delivery System for Curcumin

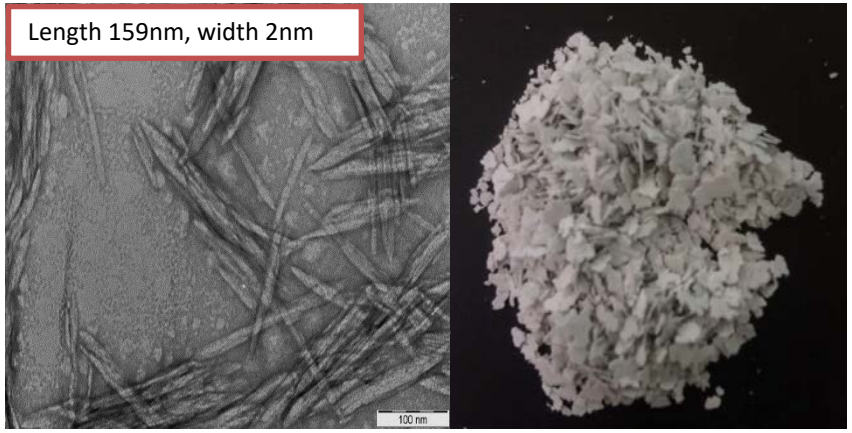


Figure 5: TEM micrograph of cellulose nanocrystal.

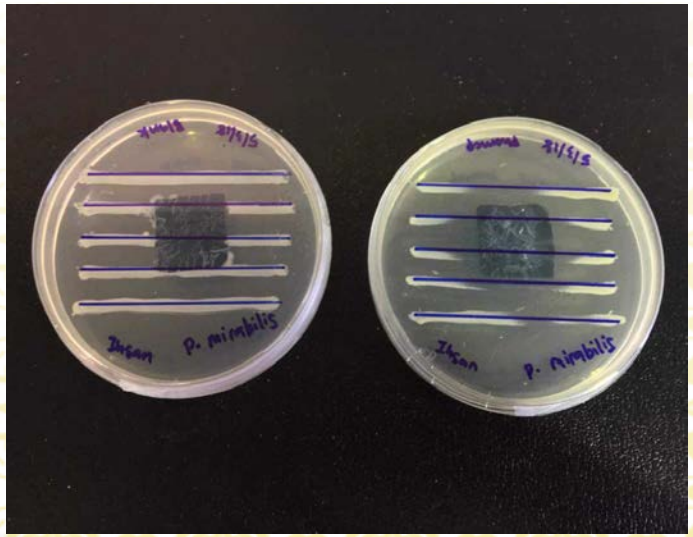


Figure 6: Cross streak test (ASTM).

Table 2: Antimicrobial activity of curcumin nanocellulose film on ASTM cross streak test.

Test bacteria	Diameter of inhibition zone (mm)	
	Curcumin loaded film	Negative control
Gram positive bacteria		
MRSA	42.0 ± 2.7	-
Streptococcus sp.	49.0 ± 9.5	-
B. cereus	-	-
B. coagulans	67.0 ± 4.4	-
Gram negative bacteria		
E. coli	53.7 ± 3.5	-
P. mirabilis	62.3 ± 2.5	-
Yersinia sp.	-	-
P. aeruginosa	-	-
Yeasts		
C. albicans	25.7 ± 1.2	-
C. utilis	-	-

Antimicrobial Wound Dressing Film Utilizing Cellulose Nanocrystal as Drug Delivery System for Curcumin

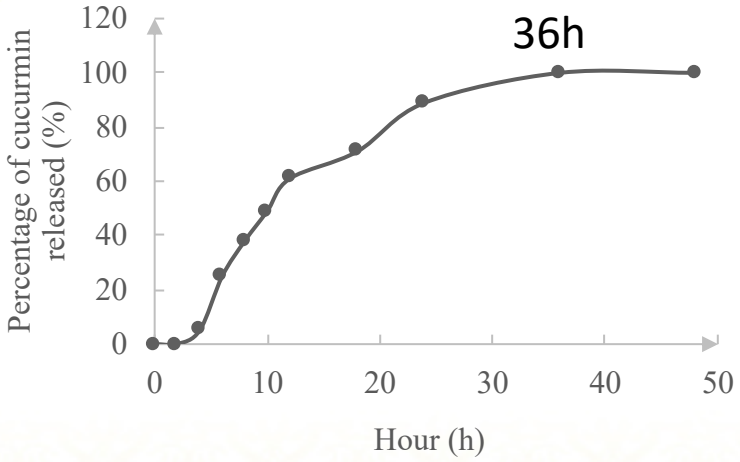


Figure 7: Curcumin release profile from the developed nanocellulose film.

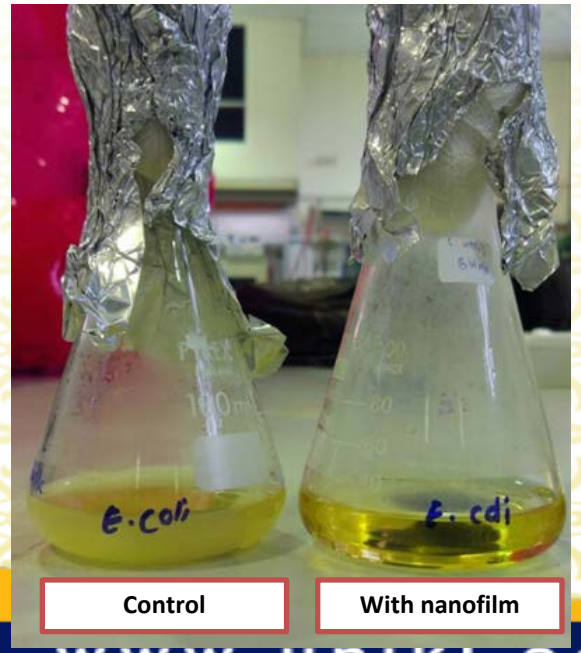
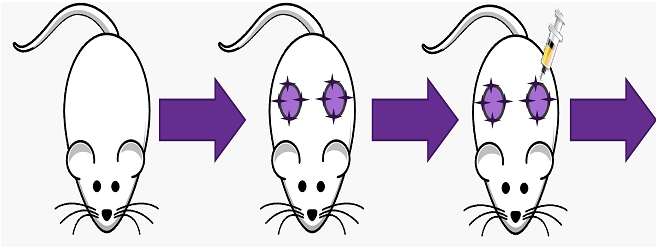


Figure 8: *E. coli* culture treated with nanocellulose film showed no bacterial growth.

Table 3: The % of growth reduction of test microorganisms with the treatment of nanocellulose film.

Test bacteria	% of growth reduction		
	0 wash	5 washes	15 washes
MRSA	99	99	99
Streptococcus sp.	88.4	86.5	85.3
B. coagulans	99	99	97
E. coli	99	99	99
P. mirabilis	99	99	99
C. albicans	99	99	98

Antimicrobial Wound Dressing Film Utilizing Cellulose Nanocrystal as Drug Delivery System for Curcumin



Diabetic rat models | Derma wound incision | Treatment with wound dressing

1. Measurement of wound size
2. Bacterial load of wound

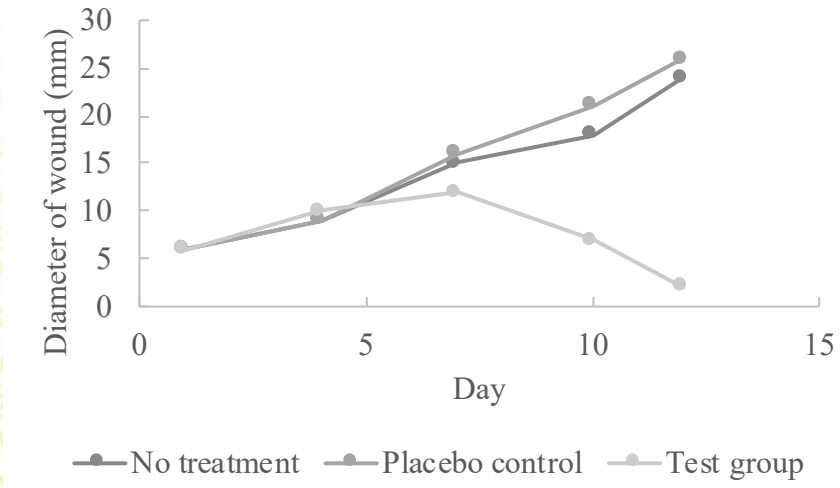
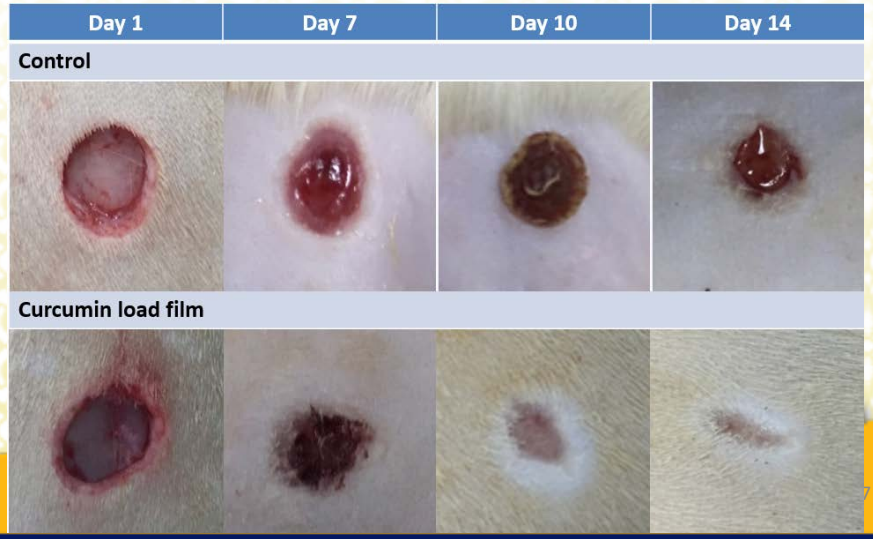


Figure 9: The diameter of wound recorded for the diabetic rat models for a duration of 12 days.

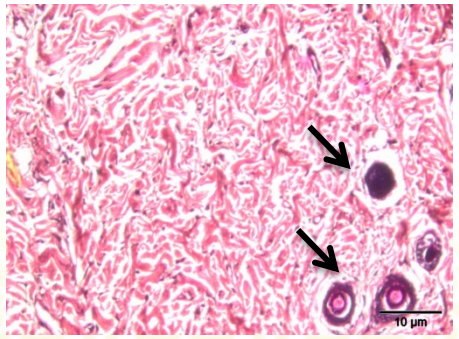
Table 4: The bacteria load of the skin sample excised from the diabetic rat models.

Group	Bacterial load (CFU/ml)
No treatment	7.23×10^7
Placebo control	6.48×10^7
Test group (Curcumin loaded film)	1.24×10^2

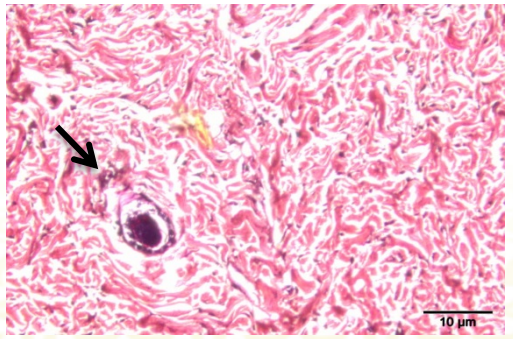


Antimicrobial Wound Dressing Film Utilizing Cellulose Nanocrystal as Drug Delivery System for Curcumin

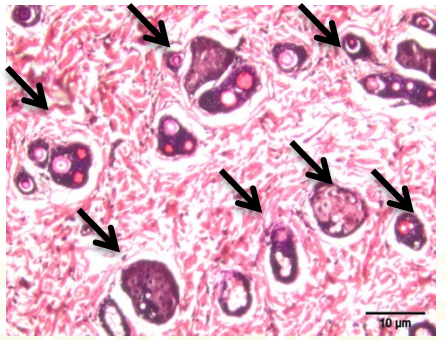
The histological examination of the skin sample excised from diabetic rats



No treatment



Placebo control



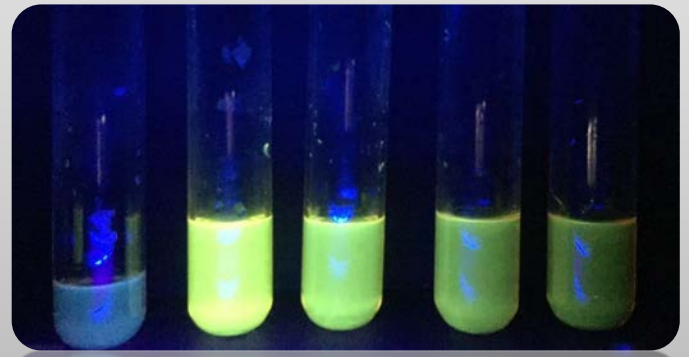
Test group with curcumin loaded film

The results showed that curcumin loaded film significantly improved the regeneration of hair follicles, blood vessels and sebaceous glands of the skin, by inhibiting the growth of bacteria.

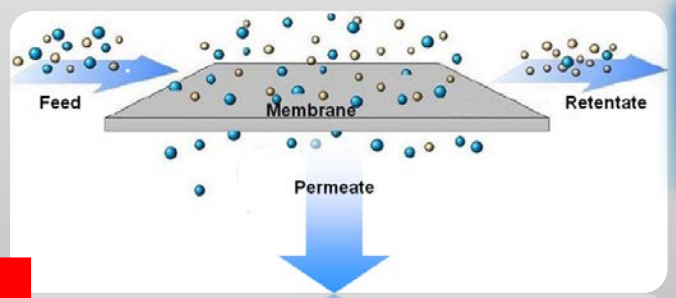
Universiti Kuala Lumpur
Where Knowledge is Applied

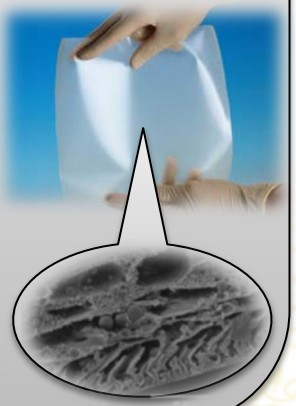
A New Generation of Selective Extraction

Fluoro-Chemosensor Selectivity



Membrane Separation Technology





Food technology

Biotechnology

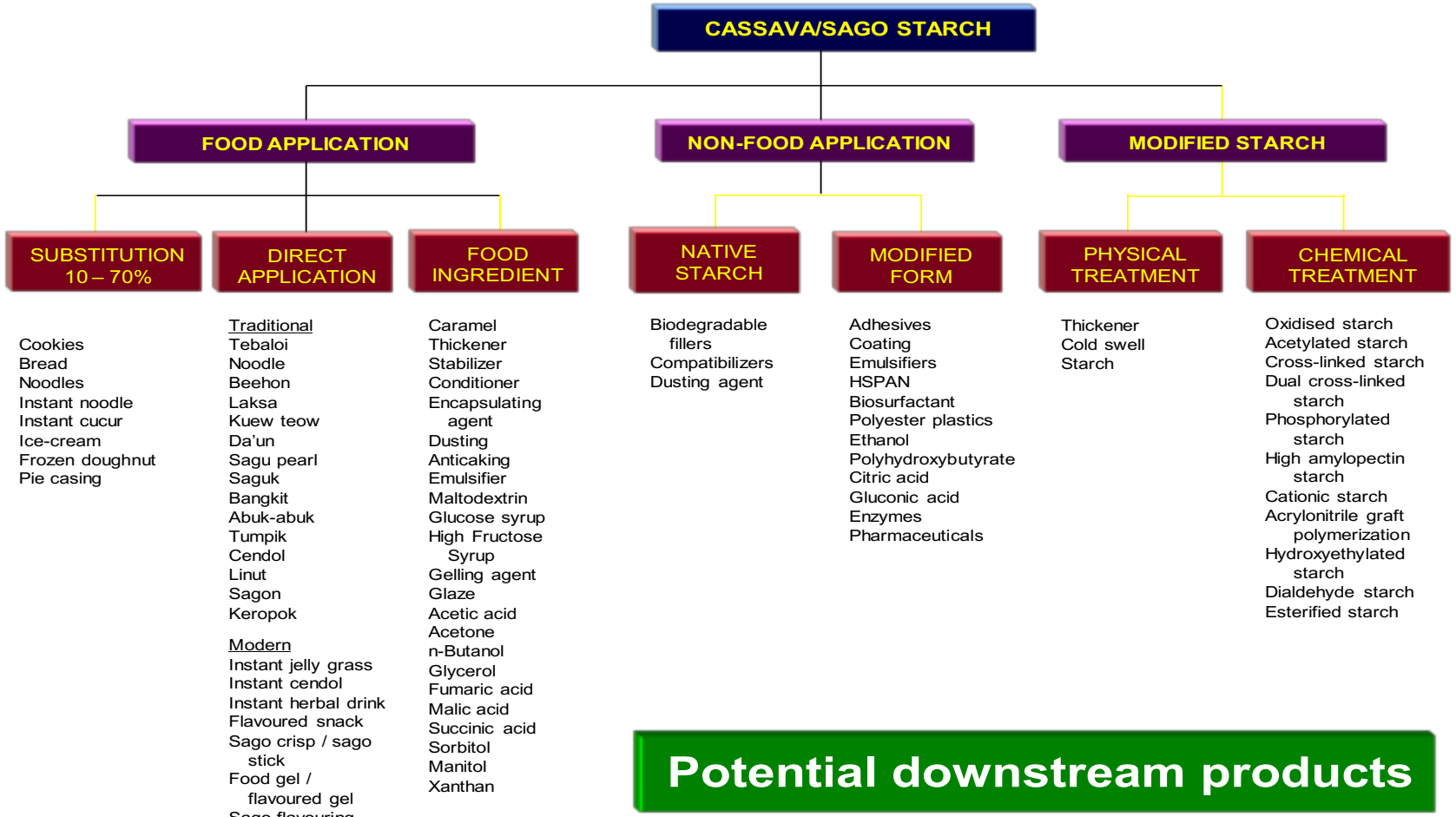
Pharmaceutical Industry

Waste water treatment

Biomaterial Cluster

- Focused on development of **ADVANCED STARCH TECHNOLOGY** in particular, local starches namely sago and cassava. It is an effort to value-add starch-based products and diversify its utilisation while improving the quality and quantity of indigenous starch.
- Also active in developing **INTEGRATED TECHNOLOGIES** to facilitate the establishment of **VALUE-ADDED HALAL FOOD AND INGREDIENTS** such as prebiotics, gelatin replacement and modified starches.

Research Interest



Cluster Members

No.	Name	Role	Area of Specialization
1.	Assoc. Prof Dr Abdul Manan Bin Dos Mohamed	Principal	Food Biotechnology
2.	Dr Mazidah Abdul Rahman	Member	Food Technology
3.	Dr Noriza Ahmad	Member	Food Technology
4.	Puan Rinani Shima Abd Rashid	Member	Food Technology
5.	Faridatul Ain Mohd Rosdan	Member	Food Technology

Research Cluster: Bioengineering

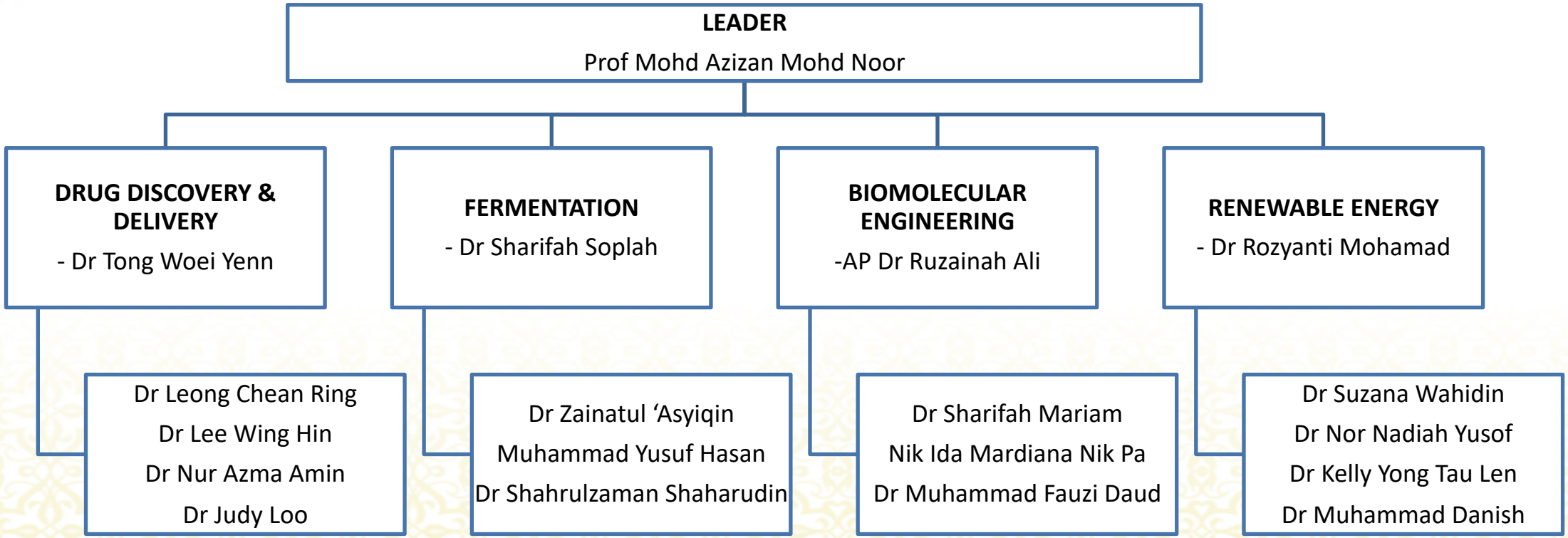
DRUG DISCOVERY & DELIVERY
RESEARCH LABORATORY

Biomolecular
Engineering
Lab

fermentation

Renewable Energy

Research Cluster: Bioengineering



Associate Members

- Prof. Dato' Mohd Isa Abdul Majid (associate, USM)
- Prof. Dr. Darah Ibrahim (associate, USM)
- Dr. Tan Ween Nee (associate, USM)
- Prof. Dr. Tsukasa Seya (associate, Hokkaido University)
- Prof. Dr. Yoshihito Shirai (associate, Kyutech)
- Prof. Dr. Mohd Ali Hassan (associate, UPM)

Our Laboratories

Chemical & Bioengineering based Technology

36 LABORATORIES