1. PERSONAL DATA

Name	:	Prof. Dr. K. Sudesh Kumar FASc
Nationality	:	Malaysian
Researcher ID	:	C-2942-2011
Author ID	:	6602451896
ORCID	:	https://orcid.org/0000-0003-4756-9192
Current Position	:	Professor of School of Biological Sciences, USM Consultant, RIKEN, Japan Chief Editor of Malaysian Journal of Microbiology Fellow of Academy of Sciences Malaysia
Qualifications	:	Degree : Doctor of Philosophy (Ph.D) Field : Molecular Biology Year : 1999 Name and Place of Institution : Saitama University and RIKEN Institute, Japan. Degree : Master of Biotechnology Field : Biotechnology Year : 1994 Name and Place of Institution : University Malaya, Malaysia Degree : Bachelor of Science (Hons.) Field : Zoology Year : 1991 Name and Place of Institution : Universiti Kebangsaan Malaysia
Field of specialization	:	Microbiology, Genetics and Polymer Chemistry of Microbial Polyesters (Bioplastics)
Tel (office) /HP	:	+604-6534367 / +6012-4022434
Fax	:	+604-6565125
Email	:	*ksudesh@usm.my*
Affiliation		School of Biological Sciences Universiti Sains Malaysia 11800 Penang. MALAYSIA

2. ACHIEVEMENTS

Active grants :

1. Title: Research and collaboration on biodegradable plastics PHA genes expression in *Hevea* tissue culture
   Sponsorship: Sumitomo Rubber Industries Ltd. (SRI)
   Amount: RM 1, 219, 438.00
   Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Mr. Kazuhisa Fushihara/Dr. Yukino Miyagi
   Date/Duration: 1 Sep 2013 – 31 Oct 2020 (Anually renewed)

2. Title: Development of new biopolymers for medical and therapeutic applications in aged patients
   Sponsorship: RU Grant, USM
   Amount: RM 250,000
   Researchers: **Prof. Dr. K. Sudesh**
   Date/Duration: 1 Aug 2015 – 31 Jul 2020

3. Title: Synthesis and evaluation of PHA for industrial application
   Sponsorship: FUENCE Co., Ltd., Japan
   Amount: RM 434,165.32
   Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
   Date/Duration: 1 Nov 2016 – 30 Apr 2020

4. Title: Understanding of cold-adapted ARB10 lipase from artic *Pseudomonas* sp. by site-directed mutagenesis and heterologous expression
   Sponsorship: Research University Grant (USM)
   Amount: RM 54,300
   Researchers: Assoc. Prof. Dr. Rashidah Abdul Rahim, **Prof. Dr. K. Sudesh**
   Date/Duration: 1 Jun 2017 – 31 May 2020

5. Title: Effect of growth for oil palm nursery by polyhydroxybutyrate and oil palm fiber: metagenome analysis through soil microbiome
   Sponsorship: JIRCAS, Japan
   Amount: RM 34,482.76
   Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
   Date/Duration: 25 May 2017 – 31 Aug 2020

6. Title: Human umbillical cord-derived mesenchymal stem cells promote corneal epithelial growth on polyhydroxyalkanoate polymers for corneal regenertion and wound healing
   Sponsorship: Research University Grant (USM)
   Amount: RM 98,396.00
   Researchers: Assoc. Prof. Dr. Bakiah Shaharuddin (Project Leader), **Prof. Dr. K. Sudesh,** Dr. Tan Jun Jie, Dr. Siti Hawa Ngalim
   Date/Duration: 1 April 2018 – 31 March 2021

7. Title: Polyhydroxyalkanoates as immobilisation carrier in moving bed biofilm reactor: Effects of physiochemical and biological factors
   Sponsorship: Ministry of Education (MOE)
   Amount: RM 106,000.00
   Researchers: Dr. Ng Si Ling (Project Leader), Assoc. Prof. Dr. Adeline Ting Su Yien, **Prof. Dr. K. Sudesh,** Dr. Lim Jun Wei
   Date/Duration: 1 Jan 2019 – 31 Dec 2020

8. Title: Understanding the cellular uptake and host response of inhalable micro- and nano-polyhydroxyalkanoate (PHA) particles containing clodronate to target alveolar macrophages for rapid treatment of tuberculosis
   Sponsorship: Ministry of Education (MOE)
   Amount: RM 204,200.00
   Researchers: Dr. Thaigarajan Parumasivam (Project Leader), **Prof. Dr. K. Sudesh,** Dr. Lee Wing Hin, Dr. Suriyati Binti Mohamad
   Date/Duration: 1 Jan 2019 – 31 Dec 2021

9. Title: Investigation on the structure-function relationship between natural rubber polymer and proteins in the latex of Malaysian *Hevea* clones
   Sponsorship: FRGS Ministry of Education (MOE)
   Amount: RM 111,500.00
   Researchers: Dr. Mohd Nazri Bin Ismail (Project Leader), Prof. Dr. Mohd Nazalan Bin Najimudin, **Prof. Dr. K. Sudesh**
   Date/Duration: 1 Jan 2019 – 31 Dec 2020

10. Title: Characterization and development of poly(cis-1,4-isoprene) rubber degrading enzyme found in Actinobacteria isolated from Sarawak
    Sponsorship: Jabatan Ketua Menteri Sarawak
    Amount: RM 80,000.00
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Ann Anni Basik
    Date/Duration: 1 Sep 2018 – 31 Aug 2021

11. Title: Sustainable replantation of oil palm by adding value to oil palm trunk through scientific and technological innovation
    Sponsorship: Japan International Cooperation Agency (JICA) and Ministry of Education of Malaysia (MOE)
    Amount: Total is RM 16, 085 000 (RM 11 million from JICA and RM 5.085 million from MOE)
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Madya Dr. Amir Hamzah Bin Ahmad Ghazali, Dr. Shangeetha A/P Ganesan, Dr. Siti Baidurah Binti Yusoff, Dr. Chee Jiun Yee, Dr. Azlinah Binti Mohd Sulaiman, Dr. Hasber Bin Salim.
    Date/ Duration: 2019 to 2024

Completed grants :

1. Title: Production and characterization of novel polyhydroxyalkanoates (PHAs) from locally isolated micro-organisms
   Sponsorship: Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education (MoHE)
   Amount: RM 65,300
   Researchers: **Dr. K. Sudesh** (Project Leader)
   Date/Duration: 15 Nov 2002 – 14 Oct 2004

2. Title: Molecular design and biosynthesis of absorbable biopolymers: towards the production of therapeutics biomaterials
   Sponsorship: IRPA Special Grant (MOSTI)
   Amount: RM 159,000
   Researchers: **Dr. K. Sudesh** (Project Leader)
   Date/Duration: 1 Nov 2003 – 31 Oct 2005

3. Title: Studies on the surface nanostructures of intracellular polyester granules produced by microorganisms using atomic force microscopy
   Sponsorship: Malaysia Toray Science Foundation (MTSF)
   Amount: RM 20,000
   Researchers: **Dr. K. Sudesh** (Project Leader), Prof. Dato' Dr. Mohamed Isa Bin Abd Majid
   Date/Duration: 1 Jan 2004 – 31 Dec 2005

4. Title: Molecular characterization of polyhydroxyalkanoate biosynthesis genes of Cyanobacteria: towards photosynthetic production of bioplastics
   Sponsorship: Malaysia Toray Science Foundation (MTSF)
   Amount: RM 30,000
   Researchers: **Dr. K. Sudesh** (Project Leader)
   Date/Duration: 1 Dec 2004 – 30 Nov 2005

5. Title: Molecular design and synthesis of nanostructured block biopolymers with self assembly properties
   Sponsorship: Science Academic Malaysia
   Amount: RM 265,000
   Researchers: **Dr. K. Sudesh** (Project Leader), Prof. Dr. Jamil Bin Ismail, Dr. Mohd Razip Bin Samian
   Date/Duration: 1 Dec 2004 – 1 Oct 2007

6. Title: Determination of factors affecting the bioconversion efficiency of palm oil products into microbial polyhydroxyalkanoates (bioplastics)
   Sponsorship: USM Short Term Grant
   Amount: RM 19,990
   Researchers: **Dr. K. Sudesh** (Project Leader), Prof. Dr. Boey Peng Lim
   Date/Duration: 1 Dec 2005 – 30 Nov 2007

7. Title: Molecular characterization of nano sized starch particles biogenesis in Cyanobacteria: towards the development of starch-based nanoparticles
   Sponsorship: Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education (MoHE)
   Amount: RM 39,000
   Researchers: **Assoc. Prof. Dr. K. Sudesh** (Project Leader), Assoc. Prof. Dr. Amirul Al-Ashraf Balakrishnan Bin Abdullah, Prof. Dr. Mohd Nazalan Bin Mohd Najimudin
   Date/Duration: 15 Jan 2007 – 14 Jan 2010

8. Title: Bioconversion of palm oil and its products to polyhydroxyalkanoates (PHA) (Biodegradable plastics)
   Sponsorship: IRPA Special Grant (MOSTI)
   Amount: RM 438,433
   Researchers: **Assoc. Prof. Dr. K. Sudesh** (Project Leader), Assoc. Prof. Dr. Mohd. Razip Samian, Assoc. Prof. Dr. Amirul Al-Ashraf Abdullah
   Date/Duration: Oct 2007 – 2008

9. Title: Degradation of polyhydroxyalkanoates in tropical mangrove ecosystem
   Sponsorship: USM Short Term Grant
   Amount: RM 11,360
   Researchers: **Assoc. Prof. Dr. K. Sudesh** (Project Leader)
   Date/Duration: Apr 2007 – Mar 2009

10. Title: Development of novel biobased pathways for the conversion of lignocellulose waste into bioplastics using insight from termites and their gut microbiota
    Sponsorship: 'Research University' (USM)
    Amount: RM 129,200
    Researchers: **Assoc. Prof. Dr. K. Sudesh** (Project Leader), Prof. Dr. Lee Chow Yang
    Date/Duration: Oct 2007- Sept 2009

11. Title: Biosynthesis and characterization of bioplastics from Jatropha oil, which is a non-edible vegetable oil
    Sponsorship: USM Short Term Grant
    Amount: RM 39,982
    Researchers: **Assoc. Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: Jun 2009 - May 2011

12. Title: Solar photocatalytic decolorization and detoxification of batik dye wastewater using P(3HB)-TiO_2 nanocomposite films
    Sponsorship: USM Short Term Grant
    Amount: RM 35,456
    Researchers: **Assoc. Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: Oct 2009 - Oct 2011

13. Title: The development of the bioplastics production technology from old oil palm trunks
    Sponsorship: JIRCAS/Japan
    Amount: RM 57,300
    Researcher: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 1 Jun 2011 – 29 Feb 2012

14. Title: Scaled-up pilot process for the production of bacterial polyhydroxyalkanoates (PHA), a biodegradable plastic material using palm oil and its derivatives
    Sponsorship: Techno Fund (MOSTI)
    Amount: RM 1,410,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Dr. Mohd. Razip Samian, Assoc. Prof. Dr. Amirul Al- Ashraf Abdullah
    Date/Duration: Mar 2009- Mar 2012

15. Title: Molecular basis of PHA biosynthesis by Archaebacterial strains
    Sponsorship: Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education (MoHE)
    Amount: RM 70,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Dr Amir Hamzah bin Ahmad Ghazali
    Date/Duration: Apr 2011 – Mar 2013

16. Title: The development of the bioplastics production technology from old oil palm trunks sap
    Sponsorship: JIRCAS/Japan
    Amount: RM 58,800
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 1 Jun 2012 – 30 Jun 2014

17. Title: Metagenomics of rubber-degrading microorganisms in rubber plantation
    Sponsorship: Research University Grant (USM)
    Amount: RM 246,229
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Dr. Mohd Nazalan Bin Mohd, Assoc. Prof. Dr. Mas Rosemal Hakim Mas Haris
    Date/Duration: 15 Aug 2011 – 14 Aug 2013

18. Title: Transfer of a simple, effective and sustainable technology to decolorize and detoxify Batik industry wasterwater: towards a greener Batik industry
    Sponsorship: Ministry of Higher Education (MoHE) (KTP)
    Amount: RM 170,400
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Dr. Mohd. Asri Nawi, Assoc. Prof. Dr. Srimala A/P Sreekantan
    Date/Duration: 15 Aug 2011 – 16 Feb 2014

19. Title: The development of slow release fertilizer from an oil palm trunk
    Sponsorship: JIRCAS, Japan
    Amount: RM 65,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 3 Jun 2013 – 31 Aug 2014

20. Title: Evaluation of waste cooking oil as carbon source in biosynthesis of polyhydroxyalkanoates (PHA)
    Sponsorship: USM Short Term Grant
    Amount: RM 39,474
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 15 Aug 2011 – 14 Aug 2014

21. Title: A sustainable technology transfer to detox indoor air pollutant with photo catalyst under visible light: towards a greener building
    Sponsorship: Knowledge Transfer Programme (KTP)
    Amount: RM 118,885.65
    Researchers: Prof. Madya Dr. Srimala Sreekantan (Project Leader), **Prof. Dr. K. Sudesh,** Dr. Ong Ming Thong
    Date/Duration: 14 Aug 2012 – 13 Aug 2014

22. Title: Formulation of bioplastics into controlled release fertilizer
    Sponsorship: Exploratory Research Grant Scheme (ERGS)
    Amount: RM 91,000
    Researchers: **Prof. Dr. K. Sudesh Kumar** (Project Leader), Dr. Amir Hamzah bin Ahmad Ghazali, Dr. Ahmad Fuad bin Md Yusuf
    Date/Duration: 1 Aug 2012 – 31 Oct 2014

23. Title: Establishing a network for the collection and reuse of used cooking oil (UCO)
    Sponsorship: BJIM, USM
    Amount: RM 30,630
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: Aug 2011 – Oct 2014

24. Title: Method for detection of depolymerase activity of lipases
    Sponsorship: Dana Inovasi Awal, USM
    Amount: RM 50,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Diana Ch'ng Hooi Ean
    Date/Duration: 20 Jun 2013 – 31 Dec 2014

25. Title: The simultaneous adsorption and photocatalytic degradation of crude oil using electrospun P(3HB)-TiO_2 Nanocomposite fibers
    Sponsorship: Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education (MoHE)
    Amount: RM 158,254
    Researchers: Nanthini Sridewi A/P Appan (Project Leader), **Prof. Dr. K. Sudesh**, Noor Azilah Mohd Kasim, Ahmad Farid Bin Mohd Azmi
    Date/Duration: 1 May 2013 – 30 Apr 2015

26. Title: Development of rapid densitometric lipase assay kit
    Sponsorship: Prototype Research Grant Scheme (PRGS)
    Amount: RM 194,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Dr. Rashidah Abdul Rahim
    Date/Duration: 1 Aug 2013 – 31 Jul 2015

27. Title: Development of new bio-based polymeric materials using modified PHA synthases for a sustainable tomorrow
    Sponsorship: APEX Delivering Excellence 2012 (DE2012)
    Amount: RM 501,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Mohd. Nazalan Mohd. Najimudin, Prof. Mohd. Razip Samian, Dr. Chan Chin Han, Dr. Lee Siang Yin, Dr. Keiji Numata, Dr. Hasni Arsad, Dr. Teh Aik Hong, Dr. Rashidah Abdul Rahim, Dr. Eugene Ong Boon Beng
    Date/Duration: 1 Nov 2012 – 31 Jul 2015

28. Title: Development of the delayed release fertilizer from the oil palm trunk
    Sponsorship: JIRCAS, Japan
    Amount: RM30,800
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 1 Jul 2014 – 31 Aug 2015

29. Title: Screening and characterization of metagenome-derived PHA synthase gene (phaC) from limestone soil sample of Gunung Lang, Ipoh, Perak
    Sponsorship: Fundamental Research Grant Scheme (FRGS)
    Amount: RM 82,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Dr. Mohd Nazalan Bin Mohd Najimudin
    Date/Duration: 1 Dec 2013 – 30 Nov 2015

30. Title: A novel environmentally friendly extraction method of polyhydroxyalkanoate (PHA) from biomass through biological approach
    Sponsorship: International Research Collaboration Fund (IReC), USM
    Amount: RM 279,894
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Zainal Arifin Mohd. Ishak, Assoc. Prof. Hideki Abe, Prof. Frans H.J. Maurer
    Date/Duration: 15 Jun 2013 – 14 Jun 2016

31. Title: Development of biorefinery based on rice straw
    Sponsorship: Swedish Research Council
    Amount: RM 110,948.50
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)**,** Prof. Rajni Hatti-Kaul, Dr. Doan Van Thuoc
    Date/Duration: 1 Jan 2013 – 30 Jun 2016

32. Title: Structural studies on rubber particle membrane proteins (REF & SRPP)
    Sponsorship: ScienceFund
    Amount: RM 457,400
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Dr. Teh Aik Hong
    Date/Duration: 1 Aug 2013 – 30 Jun 2016

33. Title: Hybrid treatment system for textile wastewater
    Sponsorship: Penang Green Council
    Amount: RM 50,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Dr. Chee Jiun Yee, Mr. Murugan Paramasivam, Ms. Grace Tee Pei Sze, Ms. Thaneswary Yogarajah
    Date/Duration: 1 Jul 2015 – 30 Jun 2016

34. Title: A sustainable photocatalyst technology transfer as an initiative towards green technology implementation for good IAQ in Melaka Hospital
    Sponsorship: Ministry of Education (MoE) (KTP)
    Amount: RM 292,500
    Researchers: Prof. Madya Dr. Srimala Sreekantan (Project Leader), **Prof. Dr. K. Sudesh**, Dr. Ong Ming Thong
    Date/Duration: 2 Sep 2014 – 31 Aug 2016

35. Title: More effective and environmentally friendly use of oxidized glutathione to palm growth using palm residues
    Sponsorship: Kaneka Corporation, Japan
    Amount: RM155,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 1 Jul 2014 – 31 Aug 2016

36. Title: Evaluation of slow release fertilizer using oil palm nursery
    Sponsorship: JIRCAS, Japan
    Amount: RM 54,225
    Researchers: **Prof. Dr. K. Sudesh**
    Date/Duration: 1 May 2015 – 31 Aug 2016

37. Title: The study of doped tin oxide (SnO_2) nanostructures in poly (hydroxyalkanoates) (PHA) nanocomposites
    Sponsorship: Fundamental Research Grant Scheme (FRGS)
    Amount: RM 96,770
    Researchers: Dr. Lee Hooi Ling (Project Leader), Dr. Chuah Lee Siang, **Prof. Dr. K. Sudesh,** Nadi Braidy, Oi Boon Hong @ Ong Boon Hoong
    Date/Duration: 1 Dec 2013 – 30 Nov 2016

38. Title: Time-temperature dynamic mechanical characteristics of reactive polyhydroxyalkanotes/epoxidized natural rubber blends
    Sponsorship: Research Acculturation Collaborative Effort (RACE), Ministry of Education (MoE)
    Amount: RM 50,000
    Researchers: Dr. Valliyappan David Natarajan (Project Leader), **Prof. Dr. K. Sudesh**, Assoc. Prof. Dr. Chan Chin Han, Pn. Nurul Fatahah Asyqin Bt Zainal
    Date/Duration: 26 Jan 2015 – 26 Jan 2017

39. Title: Research in color: to decolorize textile wastewater from penfabric
    Sponsorship: Penfabric Sdn. Bhd.
    Amount: RM 245,000
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: Feb 2014 – Feb 2015

40. Title: Time-temperature dynamic mechanical characteristics of reactive polyhydroxyalkanotes/ epoxidized natural rubber blends
    Sponsorship: USM
    Amount: RM 10,000
    Researchers: **Prof. Dr. K. Sudesh**
    Date/Duration: 29 Jun 2015 – 28 Jun 2017

41. Title: Effect of polyhydroxybutyrate and trunk fiber in oil palm production
    Sponsorship: JIRCAS, Japan
    Amount: RM 58,923
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader)
    Date/Duration: 1 Jul 2016 – 31 Aug 2017

42. Title: Identification of new cellulolytic bacterial strains from tropical mangrove soil
    Sponsorship: Fundamental Research Grant Scheme (FRGS)
    Amount: RM 98,200
    Researchers: Dr. Kunasundari A/P Balakrishnan, Dr. Lye Huey Shi, Dr. Teoh Yi Peng, **Prof. Dr. K. Sudesh**, Dr. Zarina Bt Zakaria, Dr. Roshita Binti Ibrahim
    Date/Duration: 27 Oct 2015 – 30 Sep 2017

43. Title: Bioplastic from high-yielding *Azotobacter vinelandii* mutant (02-03-01-SF0260)
    Sponsorship: MOSTI (ScienceFund)
    Amount: RM 200,000
    Researchers: Dr. Pauline Liew Woan Ying, Dr. Jong Bor Chyan, Prof. Dr. Mohd. Nazalan Mohd. Najimudin, **Prof. Dr. K. Sudesh**
    Date/Duration: 1 Jan 2015 – 31 Dec 2017

44. Title: Development of an innovative medium for early detection of Fusarium disease
    Sponsorship: RUI grant, USM
    Amount: RM 147,260
    Researchers: Prof. Madya Dr. Hideyuki Hagao (Project Leader), **Prof. Dr. K. Sudesh**
    Date/Duration: 31 Dec 2014 – 30 Jun 2018

45. Title: Metagenome-based biopolymers
    Sponsorship: Long Term Research Grant Scheme (LRGS)
    Amount: RM 954,200
    Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Prof. Mohd. Razip Samian, Dr. Chan Chin Han, Dr. Ahmad Fuad bin Md Yusuf, Prof. Frans Maurer, Assoc. Prof. Dr. Tadahisa Iwata, Dr. Keiji Numata
    Date/Duration: 1 Aug 2012 – 31 Jan 2018

46. Title: Understanding the fundamental effects of polyhydroxyalkanoates (PHAs) degradation on soil microbial community through molecular approach
    Sponsorship: Fundamental Research Grant Scheme (FRGS)
    Amount: RM 139,700
    Researchers: **Prof. Dr. K. Sudesh,** Prof. Dr. Mohd. Razip Bin Samian
    Date/Duration: 2 Nov 2015 – 1 May 2018

47. Title: Biological recovery of polyhydroxyalkanoate using mealworm
    Sponsorship: Research University Grant (RUI), USM
    Amount: RM 100,000
    Researchers: **Prof. Dr. K. Sudesh**
    Date/Duration: 1 Mac 2016 – 28 Feb 2019

48. Title: Rapid and precise compositional analysis of poly (3-hydroxybutyrate-*co*-3-hydroxyhexanoate) in whole bacterial cells by thermally assisted hydrolysis and methylation-gas chromatography
    Sponsorship: USM Short Term Grant
    Amount: RM 34,920
    Researchers: Dr. Siti Baidurah Yusoff, **Prof. Dr. K. Sudesh,** Prof. Ishida Yasuyuki, Dr. Tan Joo Shun, Dr. Mohd Hazwan Hussin
    Date/Duration: 1 Mac 2017 – 28 Feb 2019

49. Title: Production of biodegradable plastic bags from polyhydroxyalkanoates
Sponsorship: Research University Grant (USM)
Amount: RM 49,000
Researchers: **Prof. Dr. K. Sudesh** (Project Leader), Dr. Siti Baidurah Yusoff, Dr. Shangeetha Ganesan, Prof. Dr. Hiroshi Uyama, Prof. Dr. Yasuyuki Ishida, Dr. Azizah Baharum @ Abdul Aziz
Date/Duration: 1 Nov 2017 – 30 Apr 2019

Graduated students : (i) **Doctor of Philosophy (Ph.D)**

1. Name: Ms. Normi Mohd. Yahaya
Year: 2006 (Graduated)
Title: Improvement of polyhydroxyalkanoate synthase from *Ralstonia eutropha* by in vitro evolution
Involvement: **Co-supervisor**

2. Name: Mr. Amirul Al-Ashraf Abdullah
Year: 2008 (Graduated)
Title: Biosynthesis and characterization of poly(3-hydroxybutyrate-*co*-4-hydroxybutyrate) copolymer from *Cupriavidus* sp. USMAA 1020
Involvement: **Co-supervisor**

3. Name: Ms. Chee Jiun Yee
Year: 2009 (Graduated)
Title: Polyhydroxyalkanoate (PHA) biosynthesis from local mixed cultures and *Burkholderia* sp. USM (JCM15050)
Involvement: **Main supervisor**

4. Name: Ms. Tang Hui Ying
Year: 2010 (Graduated)
Title: Electrospun bio-polyester scaffolds: *In vitro* and *in vivo* characterization, tissue response and bioabsorption
Involvement: **Main supervisor**

5. Name: Mr. Kesaven Bhubalan
Year: 2010 (Graduated)
Title: Development of fermentation processes for the production of PHA from palm oil
Involvement: **Main supervisor**

6. Name: Ms. Tan Yi Fen
Year: 2011 (Graduated)
Title: Regulation studies of polyhydroxyalkanoates synthase genes in *Pseudomonas* sp. USM 4-55
Involvement: **Co-supervisor**

7. Name: Ms. Nanthini Sridewi A/P Appan
Year: 2012 (Graduated)
Title: Fabrication, characterization and application of polyhydroxybutyrate-titanium dioxide nanocomposite materials
Involvement: **Main supervisor**

8. Name: Mr. Ooi Wei Yang
   Year: 2012 (Graduated)
   Title: Synthesis and characterization of thermoresponsive poly(N-isopropylacrylamide)-DNA bioconjugates
   Involvement: **Main supervisor**

9. Name: Ms. Tan Liu Tzea
   Year: 2012 (Graduated)
   Title: Catalytic activity improvement of PHB depolymerase by directed evolutionary technique and assessment by cell surface display
   Involvement: **Main supervisor**

10. Name: Ms. Chuah Jo-Ann
    Year: 2012 (Graduated)
    Title: Characterization and application of a highly active polyhydroxyalkanoate synthase
    Involvement: **Main supervisor**

11. Name: Ms. Yee Lian Ngit
    Year: 2013 (Graduated)
    Title: Metabolic engineering of *phaZ$_{CO}$* and *phaC$_{CO}$* genes in *Comamonas* sp. EB172 for polyhydroxyalkanoates (PHAs) production
    Involvement: **Co-supervisor**

12. Name: Ms. Kunasundari A/P Balakrishnan
    Year: 2014 (Graduated)
    Title: Development of a novel and environmental friendly extraction method of polyhydroxyalkanoates from the biomass
    Involvement: **Main supervisor**

13. Name: Mr. Koh Chik Boon
    Year: 2014 (Graduated)
    Title: Effects of dietery supplements on growth performance and gut microbial populations of tilapia
    Involvement: **Co-supervisor**

14. Name: Ms. Lau Nyok Sean
    Year: 2014 (Graduated)
    Title: Studies on the ability of Burkholderia sp. JCM 15050 to synthesize a novel polyhydroxyalkanoate copolymer containing 3-hydroxy-4-methylvalerate
    Involvement: **Main supervisor**

15. Name: Ms. Diana Ch'ng Hooi Ean
    Year: 2014 (Graduated)
    Title:Polyhydroxyalkanoate-based microassay for the determination of lipase depolymerizing activity
    Involvement: **Main supervisor**

16. Name: Ms. Tan Hui Hui
    Year: 2014 (Graduated)
    Title: Spectroscopic evidence for the unusual stereochemical configuration of an endosome-speciafic lipid
    Involvement: **Main supervisor**

17. Name: Ms. Yalda Davoudpour
    Year: 2014 (Graduated)
    Title: Development and characterization of nanofibers from kenaf bast to reinforce polymer composites

Involvement: **Co-supervisor**

18. Name: Ms. Hanisah Kamilah Binti Abd Razak
    Year: 2015 (Graduated)
    Title: Biosynthesis and characterization of polyhydroxybutyrate [P(3HB)] produced by *Cupriavidus necator* H16 from waste cooking oil
    Involvement: **Co-supervisor**

19. Name: Mr. Manoj Kumar Lakshmanan
    Year: 2016 (Graduated)
    Title: Biosynthesis and characterization hybrid biopolymers
    Involvement: **Main supervisor**

20. Name: Mr. Foong Choon Pin
    Year: 2016 (Graduated)
    Title: Cloning and expression of PHA biosynthesis genes from environmental resources
    Involvement: **Main supervisor**

21. Name: Ms. Wankuson Chanasit
    Year: 2016 (Graduated)
    Title: Microbial production of polyhydroxyalkanoates using crude glycerol as a carbon source
    Involvement: **Co-supervisor**

22. Name: Ms. Heng King Sern
    Year: 2016 (Graduated)
    Title: Hydrolysis of cellulosic material in rice husks for production of biopolymers
    Involvement: **Main supervisor**

23. Name: Mr. Wong Yoke Ming
    Year: 2016 (Graduated)
    Title: Design and evaluation of artificial catalysts that possess enzyme-like amidolytic catalysis
    Involvement: **Main supervisor**

24. Name: Ms. Ong Wen Dee
    Year: 2016 (Graduated)
    Title: Identification of chemicals and cataloging of genes involved in the etiolation of *Arabidopsis* under continuous blue light
    Involvement: **Main supervisor**

25. Name: Ms. Lee Yan Fen
    Year: 2017 (Graduated)
    Title: Utilizing hydrophobic probes to characterize lipid phase behavior
    Involvement: **Main supervisor**

26. Name: Ms. Nanthini Jayaram
    Year: 2017 (Graduated)
    Title: Biodegradation of natural rubber products and characterization of related genes in *Streptomyces* sp. Strain CFMR 7 (JCM 30950

Involvement: **Main supervisor**

27. Name: Mr. Murugan Paramasivam
    Year: 2017 (Graduated)
    Title:Application of poly (3-hydroxybutyrate-*co*-3-hydroxyhexanoate) in controlled release fertilizer for oil palm seedlings
    Involvement: **Main supervisor**

28. Name: Ms. Marjan Ganjali Dashti
    Year: 2017 (Graduated)
    Title: Transcriptomic analysis of *Salmonella enterica* subspecies *Enterica* serovar Typhi biofilm formation in response to antibiotic treatments
    Involvement: **Main supervisor**

29. Name: Ms. Khansaa Badie Jamil Alkaddo
    Year: 2017 (Graduated)
    Title: Polyhydroxyalkanoate (PHA) biosynthesis by wild type *Burkholderia contaminans* Kad1 and PHA-NYA synthase gene expression in *Cupriavidus necator* PHB^{-}4
    Involvement: **Co-supervisor**

30. Name: Ms. Ng Kiaw Kiaw
    Year: 2017 (Graduated)
    Title: Development of a peptide-based system for delivery of Cas9:sgRNA complexes into *Arabidopsis thaliana*
    Involvement: **Co-supervisor**

31. Name: Ms. Ong Su Yean
    Year: 2018 (Graduated)
    Title: Changes in microbial community and soil properties due to the degradation of PHA
    Involvement: **Main supervisor**

32. Name: Ms. Mok Pei Shze
    Year : 2019 (Graduated)
    Title: Bioplastic from high-yielding *Azotobacter vinelandii* mutant
    Involvement: **Main supervisor**

33. Name: Ms. Idris Zainab Ladidi
    Year : 2019 (Graduated)
    Title: Biosynthesis of polyhydroxyalkanoates from palm oil and its application
    Involvement: **Main supervisor**

34. Name: Ms. Nazila Biglari
    Year: 2019 (Graduated)
    Title: Production of polyhydroxyalkanoates (PHAs) with microorganisms from agricultural byproducts
    Involvement: **Main supervisor**

35. Name: Ms. Vicinisvarri Inderan
    Year: 2019 (Graduated)
    Title: Doped tin oxide in polyhydroxyalkanoates (PHAs) nanocomposites for gas sensor
    Involvement: **Co-supervisor**

(ii) **Master**

1. Name: Ms. Jau Mei Hui
   Year: 2005 (Graduated)
   Title: Biosynthesis and mobilization of poly(3-hydroxybutyrate) [P(3HB)] by *Spirulina platensis*
   Involvement: **Main supervisor**
2. Name: Ms. Chang Choy Wan
   Year: 2006 (Graduated)
   Title: Cloning and characterization of the *Ralstonia* sp. USMAA2-4 polyhydroxyalkanoate synthase gene
   Involvement: **Main supervisor**

3. Name: Mr. Lee Wing Hin
   Year: August 2006 (Graduated)
   Title: Biosynthesis of poly(3-hydroxybutyrate-*co*-4-hydroxybutyrate) with various compositions by *Delftia acidovorans*
   Involvement: **Main supervisor**

4. Name: Ms. Yew Saw Peng
   Year: 2008 (Graduated)
   Title: Studies on the co-accumulation of polyhydroxybutyrate and starch-like granules in *Spirulina platensis*
   Involvement: **Main supervisor**

5. Name: Ms. Judy Loo Ching Yee
   Year: 2008 (Graduated)
   Title: Synthesis and characterization of poly(3-hydroxybutyrate-*co*-3-hydroxyhexanoate) from palm oil products by *Ralstonia eutropha* $PHB^{-}4$ harboring the polyhydroxyalkanoate synthase gene of *Aeromonas caviae*
   Involvement: **Main supervisor**

6. Name: Ms. Goh Lay Koon
   Year: 2009 (Graduated)
   Title: Polyhydroxyalkanoates as reserve materials for survival during nutrient starvation and enhanced tolerance towards oxidative stress
   Involvement: **Main supervisor**

7. Name: Ms. Pamela Toh Shi Ying
   Year: 2009 (Graduated)
   Title: Phototactic motility of *Synechocystis* sp. UNIWG from brackish environment
   Involvement: **Main supervisor**

8. Name: Mr. Kam Yew Chee
   Year: 2009 (Graduated)
   Title: Cloning and characterization of an unusual polyhydroxyalkanoate acid synthase (*phaC*) gene form a *Chromobacterium* sp. isolated locally
   Involvement: Main supervisor

9. Name: Ms. Yong Kim Heok
   Year: 2010 (Graduated)
   Title: Biosynthesis and characterization of polyhydroxyalkanoates by a locally isolated *Chromobacterium* sp. USM2
   Involvement: **Main supervisor**

10. Name: Mr. Kek Yik Kang
    Year: 2010 (Graduated)
    Title: Utilization of palm oil-based by-products and wastes as feedstock for polyhydroxyalkanoate biosynthesis
    Involvement: **Main supervisor**

11. Name: Ms. Ooi Tin Fong
    Year: 2011 (Graduated)
    Title: Biosynthesis and characterization of novel polyhydroxyalkanoate by *Cupriavidus necator* PHB^{-}4 transformant harbouring PHA synthase gene of *Chromobacterium* sp. USM2
    Involvement: **Main supervisor**

12. Name: Ms. Ng Ko Sin
    Year: 2011 (Graduated)
    Title: Evaluation of jatropha oil to produce polyhydroxyalkanotes by *Cupriavidus necator* H16
    Involvement: **Main supervisor**

13. Name: Ms. Ling Siew Chen
    Year: 2012 (Graduated)
    Title: Biosynthesis of novel polyhydroxyalkanoate copolymers by *Chromobacterium violaceum*
    Involvement: **Main supervisor**

14. Name: Ms. Rathi Devi Nair A/P Gunasegavan
    Year: 2012 (Graduated)
    Title: Biosynthesis of polyhydroxyalkanoate (PHA) from a moderately halophilic bacterium
    Involvement: **Main supervisor**

15. Name: Mr. Chia Kim Hou
    Year: 2013 (Graduated)
    Title: Isolation and characterization of rubber-degrading bacteria from aged latex
    Involvement: **Main supervisor**

16. Name: Ms. Pragya Chhajer
    Year: 2013 (Graduated)
    Title: Biosynthesis and characterization of PHA terpolymers by genetically engineered bacterium
    Involvement: **Main supervisor**

17. Name: Ms. Puvaneswary A/P Kaesavan
    Year: 2014 (Graduated)
    Title: Biosynthesis of PHA using fish oil
    Involvement: **Main supervisor**

18. Name: Ms. Tai Yen Teng
    Year: 2015 (Graduated)
    Title: Cloning and characterization of PHA biosynthesis genes from metagenomic samples
    Involvement: Main supervisor

19. Name: Ms. Ng Lee Mei
    Year: 2015 (Graduated)
    Title: Characterization of novel (PHA) synthase from Aquitalea sp. USM4 (JCM19919)
    Involvement: Main supervisor

20. Name: Ms. Mok Pei Shze

Year: 2015 (Graduated)
Title: Characterization of the depolymerizing activity of commercial lipases and animal organ extracts using a simple polyhydroxyalkanoate-based microassay
Involvement: **Main supervisor**

21. Name: Mr. Saranpal Singh A/L Satinder Singh
Year: 2016 (Graduated)
Title: Structural studies on Small Rubber Particle Protein (SRPP) from *Hevea brasiliensis*
Involvement: **Main supervisor**

22. Name: Ms. Mohana Baskaran
Year: 2016 (Graduated)
Title: Characterization of oil palm trunk particleboard
Involvement: **Co-supervisor**

23. Name: Ms. Chung Corrine
Year: 2017 (Graduated)
Title: The purification and structural studies of rubber particle membrane proteins (REF and SRPP) in natural rubber biosynthesis
Involvement: **Main supervisor**

24. Name: Ms. Lee Joyyi
Year: 2017 (Graduated)
Title: Characterization and application of P(3HB-co-3HHx) and kenaf composite material
Involvement: **Main supervisor**

25. Name: Mr. Wong Yen Siang
Year: 2017 (Graduated)
Title: Growth promoting effect of oxidized glutathione (GSSG) in oil palm nursery
Involvement**: Main supervisor**

26. Name: Ms. Kavitha A/P Muniandy
Year: 2018 (Graduated)
Title: Molecular weight profiling of natural rubber from selected Malaysian Hevea brasiliensis clones and its relationship with agroclimatic parameters
Involvement: **Main supervisor**

27. Name: Ms. Lim Hui
Year : 2019 (Graduated)
Title: Biosynthesis and characterization of polyhydroxyalkanoates using genetically modified bacterial strain
Involvement: **Main supervisor**

28. Name: Ms. Ang Shaik Ling
Year : 2019 (Graduated)
Title: Fabrication of biomaterial scaffold using Bombyx mori silk fibroin and polyhydroxyalkanoate
Involvement: **Main supervisor**

Postgraduate under supervision : (i) **Ph.D**

1. Name: Ms. Sirimaporn Watcharakul
Title: Investigate and characterize the mechanisms involved in the

microbial degradation of rubber polymers and to facilitate these processes, where possible
Involvement: **Co-supervisor**

2. Name: Ms. Pyary Somarajan
Title: Biosynthesis, biorecovery and application of polyhydroxyalkanoates in the development of controlled release fertilizer
Involvement: **Main supervisor**

3. Name: Ms. Marisa Khoo Kim Gaik
Title: Establishment of *Hevea* tissue culture for the expression of PHA biosynthesis genes
Involvement: **Main supervisor**

4. Name: Mr. Lim Kok Ming
Title: Expression of polyhydroxyalkanoate (PHA) biosynthetic genes in *Hevea* tissue culture
Involvement: **Main supervisor**

5. Name: Mr. Tan Hua Tiang
Title: Mutation of PHA synthase and analysis of the substrate specificity of the mutated PHA synthase in *Cupriavidus necator* mutant in response to different carbon sources
Involvement: **Main supervisor**

6. Name: Mr. Mohd Zharif Bin Ahmad Thirmizir
Title: Development and characterization of compatibilised chemosynthetic and biosynthetic aliphatic thermoplastic polyester poly(butylenesuccinate)/poly(hydroxybutyrate-*co*-hydroxyhexanoate) blends and its kenaf composites
Involvement: **Co-supervisor**

7. Name: Ms. Noriha Binti Mat Amin
Title: Harnessing disease suppressive bacterial communities and their metabolites through metagenomics for sustainable and eco-friendly agriculture
Involvement: **Main supervisor**

8. Name: Ms. Iffa Farahin Binti Jeepery
Title: Biosynthesis and characterization of PHA from sago starch
Involvement: **Main supervisor**

9. Name: Mr. Samar Abdelrazeg Abdelrahman Salih
Title: Human umbilical cord derived Mesenchymal stem cells promote corneal epithelial growth on polyhydroxyalkanoate polymers for corneal regeneration and wound healing
Involvement: **Co-supervisor**

(ii) **Master**

1. Name: Ms. Faridah Binti M.M. Akram
Title: Reactive blends of poly(hydroxybutyrate-*co*-hydroxyhexanoate) and modified natural rubber
Involvement: **Co-supervisor**

2. Name: Mr. Thinagaran A/L Letchimanan
Title: Evaluation of palm sludge oil as a potential carbon source for PHA production
Involvement: **Main supervisor**

4. Name: Ms. Nabila Husna Binti Mohamad Hairudin
   Title: Biosynthesis and characterization of PHA using different palm oil derivatives
   Involvement: **Main supervisor**

5. Name: Ms. Chong Sin Yee
   Title: Optimisation of anthocyanin production from callus culture of *Taraxacum officinale*
   Involvement: **Main supervisor**

6. Name: Mr. Mahendran A/L Thamby Rajah
   Title: Production of bio-based and biodegradable material in genetically modified organism
   Involvement: **Main supervisor**
7. Name: Ms. Noor Afiqah Binti Ahmad Zain
   Title: Substrate specificity of PHA synthase
   Involvement: **Main supervisor**

9. Name: Mr. Freddy Franklin A/L Anthony Joseph
   Title: Evaluation of *Salmonella* Typhi antigens HlyE and YncE for the detection of typhoid fever
   Involvement: **Co-supervisor**

10. Name: Ms. Yap Saw Yin
    Title: An alternative compounding blend made by TPS/PLA/PBAT for production of affordable biodegradable and compostable plastic bag production.
    Involvement: **Co-supervisor**

11. Name: Chang Jia Yun
    Title: Polyalkonates as immobilisation carrier in moving bed biofilm reactor.
    Involvement: **Co-supervisor**

Patents/ Copyrights/ Filing :

1. Title: Biologically Degradable Polyesters. Malaysian Patent Application No. PI 20064535 (2006). **Granted** on 15 Dec 2010. Patent No.: MY-142542-A.
2. Title: Biodegradable Films for Absorption of Oil. Malaysian Patent Application No. PI 20070547 (2007). **Granted** on 28 Nov 2014. Patent No.: MY-152910-A.
3. Title: Palm Oil Based Biodegradable Copolymers. Malaysian Patent Application No. PI 20070716 (2007). **Granted** on 15 August 2011. Patent No.: MY-144072-A. LICENSED (2015)
4. Title: A Method for Producing Biodegradable Resins Malaysian Patent Application No. PI 20090146 (2009). **Granted** on 28 Aug 2015. Patent No.: MY-155003-A.

5. Title: A Biological Method for the Extraction and Purification of Polyester Granules from Bacterial Cells. Malaysian Patent Application No. PI 20092081 (2009) Chinese Application No. 201080030356.X (2014)
6. Title: Gene encoding polymer synthase and a process for producing polymer.

   (a) Malaysian Patent Application No. PI 20092412 (2009).

   (b) PCT Patent Application No. PCT/MY2010/000071

   (c) **Granted** on 31 July 2012 in Singapore. Grant P-No.: 175705.

   (d) Indian Patent Application No. 7057/DELNP/2011(2013)

   (e) Vietnam Patent No. 19556, Vietnam Patent Application No. 1-2011-02397. **Granted** on 28 June 2018 in Vietnam.

7. Title: Extraction and purification of polyester granules. Malaysian Patent Application No. PI 20092081 (2009). **Granted** on 15 May 2012. Patent No.: MY-145899-A. LICENSED (2015)
8. Title: A method for producing biodegradable resins. PCT Patent Application No. PCT/MY2010/000010
9. Title: Method for producing a polyhydroxyalkanoate in recombinant algae. (2013) USPTO application no. US 61/911,809, Japan Patent Application No. 2016-097309 (2016), PCT Patent Application No. PCT/MY2010/000071 (2014)
10. Title: Biopolymer extraction process and polymer products thereof. (2014) Sweden application no. 1400578-9, Malaysia Patent Application No. PI 2015704477 (2015) **Granted** on 4 July 2017 in Sweden. Grant no.: 539326
11. Title: A fertilizer or a soil improvement agent and plant growth method. (2016) Japan Patent Application No. 2016-097309, PCT Patent Application No. PCT/JP2017/17395 (2017)
12. Title: Non-woven fabrics and nanofiber structure from polyhydroxyalkanoates. PCT Patent Application No. PCT/JP2016/66904 (2016)
13. Title: Production of polyhydroxyalkanoic acid by only photosynthesis. JP Patent Application No. 2015-551556 (2019) **Granted** on 8 March 2019 in Japanese Patent No. 6492011
14. Title: Tin Oxide/ Polyaniline/ Polyhydroxybutyrate Biopolymer Nanocomposite as Gas Sensor. Copyright. Application number (MyIPO) LY2019002255 (2019). (Registered).
15. Title (Trademark): PHA-ntastic. Trademark application No. TM2019017268 (2019) (Filed).
16. Title: Extraction and purification of polyester granules. Indian Patent Application No. 9220/DELNP/2011 (2019). **Granted** on 11 March 2019 in Indian Patent No. 308966.
17. Title: Gene encoding polymer synthase and a process for producing polymer. Malaysian Patent Application No. PI 20092412 (2019) **Granted** on 22 April 2019. Patent No.: MY-169567-A.

Achievements/ Awards / Recognitions :

1. Fellow of the Academy of Sciences Malaysia (2019 ~)
2. Top Research Scientists Malaysia (TRSM). Academy of Sciences Malaysia, 2019 (For 2nd term: 2018 – 2022).
3. 2018 Excellence Awards ('Anugerah Sanggar Sanjung') for publication (2 awards). Universiti Sains Malaysia, 22 Sept. 2019.
4. 2018 Prize Award ('Anugerah Sanggar Sanjung') (5 awards). Universiti Sains Malaysia, 22 Sept. 2019.
5. 2018 Silver medal for "Innovation Day" with the project Bacterial Bio-Plastic from Palm Oil Mill Effluent. 2 Nov 2018. Bangi.
6. 2017 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for External Grant Category (2 awards). Universiti Sains Malaysia, 22 Oct. 2018.
7. 2017 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for Patent Category (1 award). Universiti Sains Malaysia, 22 Oct. 2018.
8. 2016 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for External Grant Category (2 awards). Universiti Sains Malaysia, 28 Oct. 2017.
9. 2016 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for Publication Category (1 award). Universiti Sains Malaysia, 28 Oct. 2017.
10. 2016 Excellent Service Award (Anugerah Perkhidmatan Cemerlang), Universiti Sains Malaysia
11. Silver award with the project 'SnO_2 nanorods: a smart ethanol gas'. The International Invention, Innovation & Design Competition (IIID Johor 2017). 9 Mar 2017, Universiti Teknologi Mara, Malaysia.
12. Silver medal for the invention Eco-friendly bioplastic-titania nanofibers capable of simultaneous adsorption & photocatalytic degradation of organic pollutants. Pertandingan rekacipta dan inovasi (PERINTIS 2016). 16 Nov 2016, Universiti Tenaga Nasional, Malaysia.
13. Gold medal for the invention Polyhydroxyalkanoate/graphene-silver nano-composite antimicrobial scaffold. Pertandingan rekacipta dan inovasi (PERINTIS 2016). 16 Nov 2016, Universiti Tenaga Nasional, Malaysia.
14. 2015 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for External Grant Category (2 awards). Universiti Sains Malaysia, 23 Oct. 2016.
15. 2015 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for Publication Category (1 award). Universiti Sains Malaysia, 23 Oct. 2016.
16. 2014 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for External Grant Category (1 award). Universiti Sains Malaysia, 16 Nov. 2015.
17. 2014 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for Publication Category (1 award). Universiti Sains Malaysia, 16 Nov. 2015.
18. 2014 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for Patent Category (1 award). Universiti Sains Malaysia, 16 Nov. 2015.
19. 2013 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for External Grant Category (1 award). Universiti Sains Malaysia, 3 Nov. 2014.
20. 2013 Excellence Awards ('*Anugerah Sanggar Sanjung'*) for Publication Category (3 awards). Universiti Sains Malaysia, 3 Nov.

2014.

21. Top Research Scientists Malaysia (TRSM). Academy of Sciences Malaysia, 2013.
22. Gold Medal for the invention of Ecofriendly and userfriendly lipase assay kit. International Exhibition of Ideas, Invention and Innovations Trade Fair (IENA 2013). 31 Oct-3 Nov 2013, Nuremberg, Germany.
23. 2012 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for External Grant Category (1 award). Universiti Sains Malaysia, 18 Sep. 2013.
24. 2012 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Publication Category (5 awards). Universiti Sains Malaysia, 18 Sep. 2013.
25. 2012 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Patent Category (2 awards). Universiti Sains Malaysia, 18 Sep. 2013.
26. Gold Medal for the invention of Ecofriendly and userfriendly lipase assay kit. 24th International Invention, Innovation & Technology Exhibition (ITEX) 2013. 9-11th May 2013, Kuala Lumpur Convention Center (KLCC), Kuala Lumpur.
27. 2011 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for External Grant Category (1 award). Universiti Sains Malaysia, 10 Jul. 2012.
28. 2011 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Publication Category (3 awards). Universiti Sains Malaysia, 10 Jul. 2012.
29. 2011 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Patent Category (1 award). Universiti Sains Malaysia, 10 Jul. 2012.
30. 2011 Prize Awards (‘*Hadiah Sanjungan’*) for Publication Category (8 prize awards). Universiti Sains Malaysia, 10 Jul. 2012.
31. 2011 Excellent Service Award (Anugerah Perkhidmatan Cemerlang), Universiti Sains Malaysia
32. 2010 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Patent Category. Universiti Sains Malaysia, 17 Mar 2011
33. 2010 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Publication Category. Universiti Sains Malaysia, 17 Mar 2011
34. 2009 Prize awards (‘*Hadiah Sanjungan’*) for Publication Category (2 awards), Universiti Sains Malaysia, 2010.
35. ICMSM 2009 Merit Award for Poster Presentation. Universiti Malaya and Malaysian Society for Microbiology, International.
36. Most accessed paper by Publisher Wiley, 2008, International.
37. 2008 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Publication Category (4 awards). Universiti Sains Malaysia, 24 Mar 2009
38. 2008 Prize Awards (‘*Hadiah Sanjungan’*) for Publication Category (5 prize awards). Universiti Sains Malaysia, 24 Mar 2009
39. 2007 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Publication Category (2 awards). Universiti Sains Malaysia, 21 Mar 2008
40. 2006 Excellence Awards (‘*Anugerah Sanggar Sanjung’*) for Product Category (1 award), Publication Category (1 award) and Prize Awards for 3 international publications. Universiti Sains Malaysia, 20 Mar 2007
41. Excellent Service Award (Anugerah Perkhidmatan Cemerlang),

Universiti Sains Malaysia, 2006

42. Silver Medal for the invention of A Novel Facial Oil Blotting Film Based on Biodegradable Thermoplastic from Palm Oil. 17th International Invention, Innovation, Industrial Design and Technology Exhibition (ITEX) 2006. 19th-21st May 2006, Kuala Lumpur Convention Center (KLCC), Kuala Lumpur.
43. Gold Medal for the invention of Natureblot: Natural and Eco-friendly Facial Oil Blotting Film. 34th International Exhibition of Inventions, New Techniques and Products of Geneva. 5-9th Apr 2006
44. Silver Medal for the invention of Novel Ecofriendly Method for Sterilization and Decolorization using Bioplastic-TiO_2 composite film. Malaysia Technology Expo 2006. PWTC, Kuala Lumpur. 23-25 Feb 2006. Ministry of Science Technology and Innovation.
45. 2005 Excellence Awards for Product Category (2 awards) and Publication Category (2 awards) (‘*Anugerah Sanggar Sanjung’*), Universiti Sains Malaysia, 13 Jan 2006
46. Gold Medal for the production of biodegradable polymer with superior properties from palm kernel oil. IPTA R&D Expo 2005, PWTC, Kuala Lumpur. 30 Sept-2 Oct 2005
47. 2005 Excellent Scientist (‘*Penghargaan Saintis Cemerlang*’ 2005). Ministry of Higher Education, Malaysia. 24 Aug 2005
48. Gold Medal (with special acknowledgement from the jury) for the invention of Novel Eco-Friendly Probe For On-Site Determination of Microbial Activity in Biological Waste Water Treatment Systems. 33rd International Exhibition of Inventions, New Techniques and Products of Geneva. 6-10th Apr 2005
49. 2004 Excellence Award for Product Category (‘*Anugerah Sanggar Sanjung’*), Universiti Sains Malaysia, Feb 2005
50. Malaysian Society for Microbiology-Biolog Award for 3rd Best Oral Presentation at the 26th Symposium of Malaysian Society for Microbiology, Langkawi. 2004
51. Malaysia Toray Science Foundation (Science and Technology Research Grant), 2004
52. Gold Medal I-Tex 2004 (Novel Eco-Friendly Probe For On-Site Determination of Microbial Activity in Biological Waste Water Treatment Systems)
53. Malaysia Toray Science Foundation (Science and Technology Research Grant), 2003
54. Bronze Medal Geneva 2002 (Liquid Bioplastic)
55. Gold Medal I-Tex 2002 (Liquid Bioplastic)
56. Programme to Encourage Malaysian Citizen with Expertise Residing Overseas to Return to Malaysia. Human Resource Ministry. 2001
57. Best Poster Presentation Award at the 10th International Symposium on Phototrophic Prokaryotes, Barcelona, Spain. 2000
58. Special Postdoctoral Fellowship, RIKEN Institute, Japan, 2000-2001
59. Japanese Government Scholarship (Monbusho). 1995-1999
    Fellowship, University Malaya. 1991-1994

3. RESEARCH PUBLICATIONS:

1. Tan, I. K. P., **K. Sudesh Kumar**, M. Theanmalar, S. N. Gan, B. Gordon III. (1997) Saponified palm kernel oil and its major free fatty acids as carbon substrates for the production of polyhydroxyalkanoates in *Pseudomonas putida* PGA1. Appl. Microbiol. Biotechnol. 47(3):207-211.
2. **Sudesh, K.**, T. Fukui, Y. Doi. (1998) Genetic analysis of *Comamonas acidovorans* polyhydroxyalkanoate synthase and factors affecting the incorporation of 4-hydroxybutyrate monomer. Appl. Environ. Microbial. 64(9):3437-3443.
3. **Sudesh, K.**, T. Fukui, K. Taguchi, T. Iwata, Y. Doi. (1999) Improved production of poly(4-hydroxybutyrate) by *Comamonas acidovorans* and its freeze-fracture morphology. Int. J. Biol. Macromol. 25(1-3):79-85.
4. **Sudesh, K.**, H. Abe, Y. Doi. (2000) Synthesis, structure and properties of polyhydroxyalkanoates: biological polyesters. Prog. Polym. Sci. 25(10):1503-1555.
5. **Sudesh, K.,** Y. Doi. (2000) Molecular design and biosynthesis of biodegradable polyesters. Polym. Adv. Technol. 11(8-12):865-872.
6. **Sudesh, K.**, T. Fukui, T. Iwata, Y. Doi. (2000) Factors affecting the freeze-fracture morphology of *in vivo* polyhydroxyalkanoate granules. Can. J. Microbiol. 46(4):304-311.
7. **Sudesh, K.**, K. Taguchi, Y. Doi. (2001) Can cyanobacteria be a potential PHA producer? RIKEN Rev. No. 42:75-76.
8. Su, F., T. Iwata, **K. Sudesh,** Y. Doi. (2001) Electron and X-ray diffraction study on poly(4-hydroxybutyrate). Polymer. 42(21):8915-8918.
9. **Sudesh, K.**, Z. Gan, A. Maehara, Y. Doi. (2002) Surface structure, morphology and stability of polyhydroxyalkanoate inclusions characterised by atomic force microscopy. Polym. Degradation Stab. 77(1):77-85.
10. **Sudesh, K.**, K. Taguchi, Y. Doi. (2002) Effect of increased PHA synthase activity on polyhydroxyalkanoates biosynthesis in *Synechocystis* sp. PCC6803. Int. J. Biol. Macromol. 30(2):97-104.
11. **Sudesh, K**, Z. Gan, K. Matsumoto, Y. Doi. (2002) Direct observation of polyhydroxyalkanoate chains by atomic force microscopy. Ultramicroscopy. 91(1-4):157-164.
12. **Sudesh, K.** (2004). Microbial polyhydroxyalkanoates (PHAs): an emerging biomaterial for tissue engineering and therapeutic applications. Med. J. Malaysia. 59 Suppl. B:55-56.
13. **Sudesh K**, L. L. Few, M. N. M. Azizan, M. I. A. Majid, M. R. Samian, N. Najimudin. (2004) Biosynthesis and characterization of polyhydroxyalkanoate blends accumulated by *Pseudomonas* sp. USM 4-55. J. Biosci. 15(2):15-28.
14. Amirul, A. A, B. Y. Tay, C. W. Chang, M. N. M. Azizan, M. I. A. Majid, **K. Sudesh.** (2004) Biosynthesis and characterization of poly(3-hydroxybutyrate-*co*-4-hydroxybutyrate) produced by an *Alcaligenes* sp. USM2-4 isolated from environmental samples. J. Biosci. 15(2):125-135.
15. Lee, W.-H., M. N. M. Azizan, **K. Sudesh**. (2004) Effects of culture conditions on the composition of poly(3-hydroxybutyrate-*co*-4-hydroxybutyrate) synthesized by *Comamonas acidovorans*. Polym. Degradation Stab. 84(1):129-134.
16. **Sudesh, K.**, A. Maehara, Z. Gan, T. Iwata, Y. Doi. (2004) Direct observation of polyhydroxyalkanoate granule-associated-proteins on native granules and on poly(3-hydroxybutyrate) single crystals by atomic force microscopy. Polym. Degradation Stab. 83(2):281-287.
17. **Abedi, H.**, Mir Mohammad Sadeghi, H., Jafarian, A., Lamei, H., Agus, J., **Sudesh, K**., Abe, H., Doi, H., Zhang, G., Hang, X., Green, P., Ho, K.P., Chen, G.Q. (2004). PCR cloning of type II polyhydroxyalkanoate biosynthesis genes from two *Pseudomonas* strains. Biotechnology. 6(4):1645-1650.
18. Yew, S. P, M. H. Jau, K. H. Yong, R. M. M. Abed, **K. Sudesh**. (2005) Morphological studies of *Synechocystis* sp. UNIWG under polyhydroxyalkanoate accumulating conditions. Malays. J. Microbiol. 1(1):48-52.

19. Kikkawa, Y., M. Narike, T. Hiraishi, M. Kanesato, **K. Sudesh**, Y. Doi, T. Tsuge. (2005). Organization of polyhydroxyalkanoate synthase for in vitro polymerization as revealed by atomic force microscopy. Macromol. Biosci. 5(10):929-935.
20. Jau, M.-H., S.-P. Yew, P. S. Y. Toh, A. S. C. Chong, W.-L. Chu, S.-M. Phang, N. Najimudin, **K. Sudesh**. (2005) Biosynthesis and mobilization of poly(3-hydroxybutyrate) [P(3HB)] by *Spirulina platensis*. Int. J. Biol. Macromol. 36(3):144-151.
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