






SYARA KASSIM

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QUALIFICATIONS

- Doctor of Philosophy Chemistry (Advanced Materials), University of College Cork
- Master of Science (Chemistry), Universiti Kebangsaan Malaysia
- Bachelor of Science (Chemistry), Universiti Kebangsaan Malaysia

FIELD OF RESEARCH

- Polymer Materials
- Nanomaterials
- Photonic crystals

RESEARCH INTEREST

Her research work is in the area of polymer nanomaterials based photonic crystals application. She has been actively working in the design or synthesis polymer (e.g. poly(methyl methacrylate), polystyrene, co-polymer (styrene + methyl methacrylate) in nanometre size ranging from 200 nm–900 nm. She is also working on the design and development of PMMA@Au, PMMA@Ag, PMMA@alloy core-shell nanoparticles, where the metallic nanoparticles embedded onto the PMMA spheres as a potential in surface-enhanced Raman spectroscopy (SERS). The SERS (Surface Enhanced Raman Scattering) technique is known to be a powerful method for chemical and biological **sensing** applications. It is now a very effective tool to analyze molecules by highly increasing the Raman signal intensity coming from molecules which have been adsorbed on nano-sized metal structures, in particular Au, Ag or Cu.

RESEARCH PROJECTS

- Surface-Enhanced Raman Scattering Spectroscopy Based on Metal Nano-Alloys Embedded Photonic Crystal

- Effect of Barium Titanate Additions on Microstructure and Electrical Properties of Zinc Oxide based Varistor Ceramics
- Synthesis of Composite Silica, Poly(methyl methacrylate) & Thiosemicarbazone Complexes via Co-Crystallisation Method : A New Route to the Production of 3-Dimensional Metallodielectric Photonic Crystals (MDPC) as Potential for Solar Cells Application.
- Synthesis and characterisation of highly monodisperse Poly(methyl methacrylate)@Au core-shell as potential substrates in 3-D metallodielectric photonic crystals for surface-enhanced Raman scattering (SERS).
- Synthesis of Copolymer Poly(MMA-STY) coated with nano bimetallic alloy (Ag-Cu) Substrates in 3D metallodielectric Photonic Crystals
- Synthesis and characterization of composite Silica, pmma and alloy (Au-Ag) via co-crystallize as potential for photonic crystal in solar cell application
- Synthesis and characterization of Au-Cu nano alloy embedded onto poly(methyl methacrylate) for plasmonic enhancement in Raman scattering

EXPERT LINKAGES

- TYNDALL NATIONAL INSTITUTE, UNIVERSITY COLLEGE CORK, IRELAND
- ADVANCED MATERIALS AND BIOENGINEERING RESEARCH (AMBER) CENTRE, TRINITY COLLEGE DUBLIN, DUBLIN 2, IRELAND
- PHOTONICS RESEARCH CENTER, UNIVERSITY OF MALAYA
- *UNIVERSITI KEBANGSAAN MALAYSIA*

PROFESSIONAL MEMBERSHIP

- Hong Kong Chemical, Biological, Environmental Engineering Society (HKCBEEES)
- Institut Kimia Malaysia (IKM)

GRANTS

Project : Synthesis of Composite Silica, Poly(methyl methacrylate) & Thiosemicarbazone Complexes via Co-Crystallisation Method : A New Route to the Production of 3-Dimensional Metallodielectric Photonic Crystals (MDPC) as Potential for Solar Cells Application

Position : Principal investigator

Grant Name : Research Acculturation Grant Scheme (RAGS) funded by Ministry of Higher Education

Status : Completed

Amount : RM 32,000

Project : Synthesis and characterisation of highly monodisperse Poly(methyl methacrylate)@Au core-shell as potential substrates in 3-D metallodielectric photonic crystals for surface-enhanced Raman scattering (SERS)

Position : Co-Researcher

Grant Name : Fundamental Research Grant Scheme (FRGS)

Status : Completed

Amount : RM 98,800

Project : Synthesis, Characterization and Recognition Layer studies of Heck-Schiff-Base Derivatives via Direct Immobilization Technique as Potential Active Materials for DNA Sensor

Position : Co-Researcher

Grant Name : Fundamental Research Grant Scheme (FRGS)

Status : Completed

Amount : RM 136, 779

Project : Effect of Barium Titanate Additions on Microstructure and Electrical Properties of Zinc Oxide based Varistor Ceramics

Position : Co-Researcher

Grant Name : Talent and Publication Enhancement-Research Grant (TAPE-RG)

Status : Completed

Amount : RM 20,000

Project : Elucidating Plasmonics Enhancement Factor of Hybrid Au-Ag Embedded Styrene-Methyl Methacrylate Copolymer Nanospheres

Position : Principal investigator

Grant Name : Fundamental Research Grant Scheme-RACER (FRGS-RACER)

Status : On-going

Amount : RM 105,100

AWARDS

No.	Awards	Year	Level
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1	<p>Best Award</p> <p><i>Awarded in eCarnival Research Innovation (eCRI'2020) organized by UMK</i></p> <p><i>HyPho: Metarmorphosis of Light to Nanotech</i></p>	2020	National
2	<p>Gold Medal</p> <p><i>Awarded in eCarnival Research Innovation (eCRI'2020) organized by UMK</i></p> <p><i>HyPho: Metarmorphosis of Light to Nanotech</i></p>	2020	National
3	<p>Gold medal</p> <p>awarded in Research and Innovation Week (MPI 2019) organized by UMT-TATI-Unisza.</p> <p><i>Dio-Nanogold:From Worm to New Functional Nanogold</i></p>	2019	National
4	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2019) organized by UMT-TATI-Unisza.</p> <p><i>MarAuNo : Your New Eco-Friendly Paint Colorant</i></p>	2019	National
5	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2019) organized by UMT-TATI-Unisza.</p>	2019	National

	<i>MExSY : Hybrid Photonic Substrates</i>		
6	<p>Silver medal</p> <p>awarded in International Invention, Innovation & Technology Exhibition (ITEX 2018), KLCC</p> <p><i>MarAuNo : From Worm To New Functional Nanogold</i></p>	2019	International 1
7	<p>Silver medal</p> <p>International Conference and Exposition on Invention by Institutions of Higher Learning 2019 (PECIPTA'19)</p> <p><i>MAuRAuNo : From Worm to New Functional Nanogold</i></p>	2019	International 1
8	<p>Gold Prize</p> <p>awarded by Korea Invention Promotion Association in Seoul International Invention Fair 2019, Seoul, Korea.</p> <p><i>MAuRAuNo : From Worm to New Functional Nanogold</i></p>	2019	International 1
9	<p>Winner (Fundamental Sciences)</p> <p>e-Novel Research and Innovation Competition 2019 (e-NRIC) 19-21 April 2019 Organised by Universiti Sains Malaysia</p>	2019	International 1

	<i>MExSY : Hybrid Photonic Substrates</i>		
10	<p>Gold medal</p> <p>awarded in Research and Innovation Week (MPI 2018) organized by UMT-TATI-Unisza.</p> <p><i>Tri Mat : Smart Nano Bimetallic</i></p>	2018	National
11	<p>Gold medal</p> <p>awarded in Research and Innovation Week (MPI 2018) organized by UMT-TATI-Unisza.</p> <p><i>Ze-Pulze : Power Crystals</i></p>	2018	National
12	<p>Gold medal</p> <p>awarded in Research and Innovation Week (MPI 2018) organized by UMT-TATI-Unisza.</p> <p><i>Hypromellose-MMA : BioDeg-NanoDuO Polymer</i></p>	2018	National
13	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2018) organized by UMT-TATI-Unisza.</p> <p><i>HyPo-QDots Nano : Future Fluorescence Device</i></p>	2018	National

14	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2018) organized by UMT-TATI-Unisza.</p> <p><i>aZTec : ZnO-BaTiO₃ based ceramic varistor for fast response clamp arrester</i></p>	2018	National
15	<p>Bronze medal</p> <p>awarded in Research and Innovation Week (MPI 2018) organized by UMT-TATI-Unisza.</p> <p><i>e-Crystal : Frontier Solar Cell</i></p>	2018	National
16	<p>Silver medal</p> <p>awarded in International Invention, Innovation & Technology Exhibition (ITEX 2018), KLCC</p> <p><i>Tri-Mat : Smart Nano Metallic</i></p>	2018	International 1
17	<p>Silver medal</p> <p>awarded in International Invention, Innovation & Technology Exhibition (ITEX 2018), KLCC</p> <p><i>Fabrication of polymer bare opal via self-assembly method based photonic crystals application</i></p>	2018	International 1
18	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2017) organized by UMT-TATI-Unisza.</p>	2017	National

	<i>Phema-Qdots : A Flourescent Probe Towards Medical Labeling</i>		
19	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2017) organized by UMT-TATI-Unisza.</p> <p><i>Synthesis of PAA, PAM and PMAA Via Inverse Miniemulsion Polymerization and Effect of Costabilizers</i></p>	2017	National
20	<p>Silver medal</p> <p>awarded in Research and Innovation Week (MPI 2017) organized by UMT-TATI-Unisza.</p> <p><i>Green Approach of Methyl Methacrylate and Styrene Co-Polymerization as a Potential Material For Photonic Crystal Application</i></p>	2017	National
21	<p>Bronze medal</p> <p>awarded in Inovasi@UMT Research Competition organized by Universiti Malaysia Terengganu.</p> <p><i>Synthesis & characterization of highly monodisperse poly(methyl methacrylate)@Gold core-shell as potential substrate in 3-D Metallodielectric Photonic Crystals</i></p>	2016	National

	<i>for Surface- Enhanced Raman Spectroscopy</i>		
21	<p>Bronze medal</p> <p>awarded in Inovasi@UMT Research Competition organized by Universiti Malaysia Terengganu.</p> <p><i>Fabrication of polymer bare opal via self-assembly method based photonic crystals application</i></p>	2016	National
22	<p>Bronze medal</p> <p>awarded in Inovasi@UMT Research Competition organized by Universiti Malaysia Terengganu.</p> <p><i>Colloidal co-crystallization : a new route to the production of three dimensional metallodielectric photonic crystals as potential in solar cell applications</i></p>	2016	National
23	<p>Bronze medal</p> <p>awarded in Inovasi@UMT Research Competition organized by Universiti Malaysia Terengganu.</p> <p><i>TSB : Potential synthesis compounds towards solar cell application</i></p>	2016	National

24	<p>Bronze medal</p> <p>awarded in Inovasi@UMT Research Competition organized by Universiti Malaysia Terengganu.</p> <p><i>Synthesis and characterisations of green polymer using water based process for photonic crystals application</i></p>	2016	National
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Awards in Academic/Professional Field

No.	Awards Recognition	Level
1	<i>Anugerah Inovasi Penyelidikan Sempena Majlis Apresiasi Pencapaian Staf Fakulti Sains dan Sekitaran Marin 2019</i>	<i>School</i>
2	<i>Anugerah Penyeliaan Pasca Siswazah Bergraduat Sempena Majlis Apresiasi Pencapaian Staf Fakulti Sains dan Sekitaran Marin 2019</i>	<i>School</i>
3	<i>Best Oral Presenter at 3rd International Conference on Materials Sciences and Nanomaterials (ICMSN 2019) Oxford University, United Kingdom</i>	<i>International</i>
4	<i>Anugerah Inovasi & Produk</i> Majlis Apresiasi Pencapaian Staf <i>School of Fundamental Science</i>	<i>School</i>

5	<p><i>Anugerah Khidmat Komuniti</i></p> <p>Majlis Apresiasi Pencapaian Staf</p> <p>School of Fundamental Science</p>	<i>School</i>
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PUBLICATIONS

Journal Article/proceedings/Chapter in Book

1. Kassim, S., Tahrin, R.A.A. & Harun, N.A. Metallic Core-Shell Photonic Crystals for Surface-Enhanced Raman Scattering (SERS). *Plasmonics* (2020). <https://doi.org/10.1007/s11468-020-01176-w>.
2. Kassim, S., Mukhtar, N. A., & Tahrin, R. A. A. (2020). Synthesis and Characterization of Plasmon-Enhanced SERS Substrate Based on Au-Ag Alloy-Coated, Large-Area Photonic (Methyl Methacrylate+Styrene) Co-Polymer. *Materials Science Forum*, 982, 14–19.
3. Kassim, S. and Azman, N. (2018). Synthesis and analysis of photonic crystal and Zn(II) complex bearing thiosemicarbazide moiety. *Progress in Industrial Ecology*, Vol. 12, No. 3, 321-329.
4. Kassim, S., Tahrin, R.A.A., Rusdi, N.F., Harun, N.A. (2018). Bimetallic PMMA@Alloy (Au-Ag) in 3D hot spots as highly sensitive substrate for high performance Surface-enhanced Raman Scattering (SERS). *ASM Sci. J.Special Issue* 2018(1) AiMS2018, 86-95.
5. Kassim, S. and Pemble, M.E. (2018) Colloidal Co-Crystallization: A New Route for Production of Three-Dimensional Metallo-dielectric Photonic Crystals. *Asian Journal of Chemistry*, 30(7), pp. 1613-1616.
6. Kassim, S., Padmanabhan, S.C., McGrath, J., and Pemble, M.E. (2015), Preparation and Properties of Silica Inverse Opal via Self-Assembly. *Applied Mechanics and Materials*, 699, 318-324.
7. Shaifudin, M.S., Ghazali, M.S.M., Abdullah, W.R.W., Kassim, S., and Kamaruzzaman W.I.W.M. (2019). Microstructure and Electrical Properties of Low-Voltage Barium Titanate Doped Zinc Oxide Varistor Ceramics. *International Journal of Recent Technology and Engineering (IJRTE)*, Vol. 8(4), 2713-2718.
8. Harun, N.A., Tzy, T.Y., Chen, L.P., Zainuddin, A.A., and Kassim, S. (2019). Copolymerization of Methacrylic Acid (MMA) and Butyl Acrylate (BuA) via emulsion polymerization technique. *Malaysian Journal of Chemistry*, Vol. 21(3), 20-28
9. Muhammad. A.R., Rosol, A.H.A., Tahrin, R.A.A., and Kassim, S. (2019). Passive Q-switching operation of erbium-doped fiber laser with gold nanoparticles embedded into PVA film as saturable absorber. *Digest Journal of Nanomaterials and Biostructures*, Vol. 14(1), 23 – 27.

10. Harun, N.A., Tahier, N.S., Kamaruddin, N.N., Mamat, M.A., & Kassim, S. (2018). Emulsion polymerization of poly(methacrylic acid) nanoparticles: effects of different cationic surfactants. *Asian Journal of Chemistry*, 30, 2299-2304.
11. Ahmad, H., Tahrin, R.A.A., Azman, N., Kassim, S., Ismail, M. A., & Maah, M.J., (2017). 1.5-micron fiber laser passively mode-locked by gold nanoparticles saturable absorber. *Optics Communications*, Vol 403 : 115-120
12. Padmanabhan, S.C., Linehan, K., O'Brien, S., Kassim, S., Doyle, D., Povey, I.M. and Pemble, M.E. (2014). A bottom-up fabrication method for the production of visible light active photonic crystals. *Journal of Materials Chemistry C*, Vol. 2, 1675-1682.
13. Shaifudin, Muhamad Syaizwadi; Ghazali, Mohd Sabri Mohd; Kamaruzzaman, Wan Mohamad Ikhmal Wan Mohamad; Wan Abdullah, Wan Rafizah; Kassim, Syara; Ismail, Nur Quratul Aini; Sa'at, Nor Kamilah; Mohd Zaid, Mohd Hafiz; Mohd Fekeri, Maria Fazira; Matori, Khamirul Amin. (2021). Synergistic Effects of Pr6O11 and Co3O4 on Electrical and Microstructure Features of ZnO-BaTiO3 Varistor Ceramics. *Materials*, Vol 14: 702
14. Tahrin, R.A.A., and Kassim, S. (2018). 3D photonic crystals based poly (methyl methacrylate) for active photonic SERS substrates. In *IOP Conference Series: Materials Science and Engineering* (Vol. 440, No. 1, p. 012018). IOP Publishing.
15. Azmi, N.S., Kamaruddin, N.N., Kassim, S., and Harun, N.A. (2018). Synthesis and characterization of hydrophilic polymer nanoparticles using n-isopropylacrylamide (NIPAM) via emulsion polymerization technique. In *IOP Conference Series: Materials Science and Engineering* (Vol. 440, No. 1, p. 012008). IOP Publishing.
16. S. M. Syaizwadi, S. S. Noradilah, M. S. M. Ghazali, W. R. W. Abdullah, S. Kasim and O. J. Lee (2018), Effect of Sintering Temperature on Zinc Oxide Varistor Ceramics. In *IOP Conference Series: Materials Science and Engineering* (Vol. 440, No. 1, p. 012037). IOP Publishing.
17. Kassim, S., Zahari, S.B., Tahrin, R.A.A. and Harun, N.A. (2017), Co-polymerization of methyl methacrylate and styrene via surfactant-free emulsion polymerization, as a potential material for photonic crystal application, *AIP Conference Proceedings*, 1885 (1), p. 020018-1-020018-8
18. Azman, N., Kassim, S., Tahrin, R.A.A. and Harun, N.A. (2017). Green feasible route preparation for PMMA vs PS: Its properties for photonic crystal application. *AIP Conference Proceedings* 1885 (1), p. 020091-1-020091-7
19. Tahrin, R.A.A., Azman, N., Kassim, S., and Harun, N.A (2017). Preparation and properties of PMMA nanoparticles as 3 dimensional photonic crystals and its thin film via surfactant-free emulsion polymerization, *AIP Conference Proceedings* 1885 (1),p. 020092-1-020092-8
20. Ismail, Z., Kassim, S., and Harun, N.A. (2017). Development of hydrophilic poly (N-vinylpyrrolidone) nanoparticles via inverse miniemulsion polymerization technique. *AIP Conference Proceedings* 1885 (1), p. 020079-1-020079-8

21. Kamaruddin, N.N., Kassim, S., and Harun, N.A. (2017). Volume effect of non-polar solvent towards the synthesis of hydrophilic polymer nanoparticles prepares via inverse miniemulsion polymerization, AIP Conference Proceedings 1885 (1), p. 020056-1-020056-8
22. Harun, N.A, Kassim, S., Muhammad, S.T., Rohi, F.E., Norzam, N.N., and Tahier, N.S.M (2017). The effect of nonionic surfactants on emulsion polymerization of poly (methacrylic acid) nanoparticles, AIP Conference Proceedings 1885 (1), p. 020032-1-020032-8
23. Kassim, S., Ahmad, I., and Daik, R. (2014). Thermal and rheological properties of acrylonitrile acrylic acid-itaconic acid terpolymers as a precursor for carbon fiber. Scientific Cooperations Workshops On Engineering Branches, Koc University, Istanbul/Turkey
24. Kassim, S., Padmanabhan, S.C., Salaun, M., and Pemble, M.E. (2011). PMMA-Gold Metallodielectric Photonic Crystals and Inverse Opals: Preparation and Optical Properties, AIP Conference Proceedings, 1391(1): p. 263-265.
25. Kassim, S., and Tahrin, R.A.A. (2018) *Hablur Fotonik*. Koleksi Bahan Pintar Sains dan Aplikasi, 11-22.

SUPERVISION

Master Degree

Thesis Title : Synthesis and characterization of highly monodispersed poly(methyl methacrylate)@Au core shell as potential substrate in 3D metallodielectric photonic crystals for surface enhanced Raman scattering (SERS)

Student Name : Rabiatul Addawiyah Azwa Binti Tahrin

Role : Main Supervisor

Status : Graduated

Thesis Title : Effect of catio on the microstructure and electrical properties of ZnO based varistor ceramics

Student Name : Muhammad Syaizwadi Bin Shaifudin

Role : Co-Supervisor

Status : Graduated

COURSE TAUGHT

- KIM3003 Organic and Analytical Chemistry Practicals
- KIM4997 Research Method in Chemical Sciences

- MPU3312 Sea Appreciation and Natural Heritage
- KIM3001 Basic Chemistry Practical
- KIM3006 Principles Organic Chemistry
- KIM4502 Paint and Coatings Chemistry
- KIM3102 Physical Chemistry Practical
- KIM3501 Polymer Chemistry
- KIM4999 Final Year Project II
- KIM4998 Final Year Project I
- KIM3002 Chemical Safety and Management
- KIM4501 Industrial Polymer Chemistry
- KIM3302 Inorganic Chemistry Practical
- KIM4604 Petrochemical

LINKS

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- Google Scholar <https://scholar.google.com/citations?user=W7ltIPYAAAAJ&hl=en>
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