

Curriculum Vitae
Professor Dr Zulkarnain Zainal

Date/Place of birth: August 9, 1962/ Semiling, Kedah, Malaysia
Citizenship: Malaysian
Marital Status: Married
Postal address: Jabatan Kimia, Fakulti Sains, Universiti Putra Malaysia, 43400
UPM Serdang, Selangor Darul Ehsan, Malaysia
Telephone: +603-89466810/4209 (Office) +603-89424450 (Home)
Fax: +603-89435380
E-mail: zulkar@science.upm.edu.my or zulkar@putra.upm.edu.my
Current position: Professor, Deputy Dean School of Graduate Studies, UPM
Field of Expertise: Materials Chemistry

Academic qualifications

Ph. D (Chemistry), UMIST, UK, 1989
B. Sc (Hons) (Chemistry), Universiti Kebangsaan Malaysia, 1985
SPM, Sekolah Menengah Pokok Sena, Kedah, 1979
Matriculation, Sekolah Alam Shah, Kuala Lumpur, 1981

Career History

Professor, Department of Chemistry UPM (since February 2005)
Assoc. Professor, Department of Chemistry UPM (August 1997- January 2005)
Lecturer, Department of Chemistry UPM (October 1989 – July 1997)
Tutor, Department of Chemistry UPM (August 1985 – October 1989)

Administration Post

Head of Department of Chemistry, UPM (June 2005- September 2007)
Deputy Dean, Faculty of Science, UPM (October 2007- September 2009)
Deputy Dean, School of Graduate Studies UPM (October 2009-now)

Awards, Medals and Fellowships

National Young Scientist Award 1998.
Excellent Service Award 2002, 2010
5 Gold, 2 Silver, 2 Bronze Medals at Invention and Research Exhibition 2002-2011, Universiti Putra Malaysia. (Project leader)
1 Gold and 1 Bronze Medals at Invention/innovation expo S&T 2002-2004 by Ministry of Science Technology and Environment. (Project leader)
2 Gold Medal, 2 Silver and 3 Bronze medals at Invention and Research Exhibition 2002, Universiti Putra Malaysia. (Co-researcher).
1 Silver Medal, Geneva International Invention and Exhibition 2004. (Co researcher)

Teaching

Subjects: electrochemistry, physical and inorganic chemistry, industrial chemistry, introductory chemistry, analytical chemistry, solid state characterization, chemical kinetics

Student Supervision

PhD 8 (5 graduated) as chairman + 10 (5 graduated) as committee member

Master 20 (14 graduated) as chairman + >19 (>12 graduated) as committee member
Final Year Project students 120

Researchs Areas

Semiconductor Electrodeposition, Photocatalysis, Activated Carbon. Lead 9 projects and researcher for more than 8 projects since 1991.

Recent Research Projects

1. Chemical and electrochemical synthesis of binary and ternary metal chalcogenides film for solar cell applications (IRPA 2002-2005 208,000).
2. Preparation and characterisation of cadmium chalcogenides thin films by pulse reversal technique for opto-electronic devices (IRPA 2003-2006 231,000).
3. Photooxidation of Organic Compounds using oxide semiconductor thin films (Fundamental 2004-2006 RM 50,000).
4. Preparation of High Efficient OLED from Metal Chalcogenides and Polythiophene Deivatives for Display Applications (Science Fund 2006-2008 RM 90,000).
5. Development of Oil Palm Carbon-Based Supercapacitors for Energy Storage (Science Fund 2006-2009 RM 102,000).
6. Mechanistic and structural aspects of metal chalcogenide films prepared by electrochemical methods (FRGS Fund 2006-2009 RM 78,000).
7. Electrochemical Growth Of Ordered Nanotubular Titania For Photoelectrochemical Cells (FRGS Fund 2010-2012 RM 55,200).
8. Tin based chalcogenides semiconductor nanofilms by pulse potential electrodeposition and their electrochemical and photoelectrochemical characteristics(RUGS 2010-2012, RM140,000)
9. Modified nickel cobalt oxide/activated carbon composite for supercapacitors (Science Fund 2012-2014, RM234,600)

Publications

156 Papers in refereed journals (118 international + 38 national)
155 Proceeding and Seminars (20 international + 135 national)
1 Patent Granted (MY-139864 Metal Chalcogenide Thin Films)
3 Module Chapters
18 H-index, 1174 citations

Selected Publication in Journals

1. Ying-Chin Lim, Zulkarnain Zainal, Mohd Zobir Hussein, Wee-Tee Tan. Effect of Water Content on Structural and Photoelectrochemical Properties of Titania Nanotube Synthesized in Fluoride Ethylene Glycol Electrolyte. *Advanced Materials Research* (2012) 501 , pp. 204-208
2. Sook-Mey Ng, Zulkarnain Zainal, Wan Mahmood Mat Yunus. Effect of Ethylenediamine Tetraacetic Acid in Electrochemical Deposition of Zinc Selenide. *Advanced Materials Research* (2012) 501 , 231-235
3. Sook-Keng Chang, Zulkarnain Zainal, Kar-Ban Tan, Nor Azah Yusof, Wan Mohamad Daud Wan Yusoff, S.R.S. Prabaharan. Nickel-cobalt Oxide/Activated Carbon Composite Electrodes for Electrochemical Capacitors. *Current Applied Physics* (2012). 12 (6) , 1421-1428

4. Sook-Keng Chang, Zulkarnain Zainal, Kar-Ban Tan, Nor Azah Yusof, Wan Mohamad Daud Wan Yusoff, S.R.S. Prabaharan. Surface Morphology and Crystallinity of Metal Oxides in Nickel-Cobalt Binary System, *Sains Malaysiana* 41(4) (2012) 465-470
5. Sook-Keng Chang, Kuang-Tsin Lee, Zulkarnain Zainal, Kar-Ban Tan, Nor Azah Yusof, Wan Mohamad Daud Wan Yusoff, Jyh-Fu Lee, Nae-Lih Wu. Structural and Electrochemical Properties of Manganese Substituted Nickel Cobaltite for Supercapacitor Application, *Electrochimica Acta* 67 (2012) 67– 72.
6. Y.C Lim, Z. Zainal. M.Z. Hussein, W.T. Tan, Anodization Parameters Influencing the Growth of Titania Nanotubes and Their Photoelectrochemical Response, *International Journal of Photoenergy* (2012) doi:10.1155/2012/638017
7. Elyas Sadeq Alaghbari, Zulkarnain Zainal, Imad Hamadneh, Mohd Zobir Bin Hussein, Mohd Haniff Bin Wahid, Effect of Doping of Zn and Ca into $\text{ErBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Superconductor Prepared via Co-precipitation Method, *Journal of Superconductivity and Novel Magnetism* (2012) 25:255-260.
8. Y.C Lim, Z. Zainal. M.Z. Hussein, W.T. Tan, Effect of Electrolyte Composition in Electrochemical Synthesis of Self-organized TiO_2 Nanotubes, *Advanced Materials Research* 364 (2012) 298-302.
9. Wahid, M.H., Zainal, Z., Hamadneh, I., Tan, K.B., Halim, S.A., Rosli, A.M., Alaghbari, E.S., Nazarudin, M.F., Kadri, E.F., Phase Formation of $\text{REBa}_2\text{Cu}_3\text{O}_{7-\delta}$ (RE: $\text{Y}_{0.5}\text{Gd}_{0.5}$, $\text{Y}_{0.5}\text{Nd}_{0.5}$, $\text{Nd}_{0.5}\text{Gd}_{0.5}$) Superconductors from Nanopowders Synthesised via Co-precipitation, *Ceramics International* 38 (2012) 1187-1193.
10. Yah Chzeh Ing, Zulkarnain Zainal, Anuar Kassim, Wan Mahmood Mat Yunus, Electrochemical Preparation of Bilayer p-n Junction of n-CdS / p-P3HT, *International Journal of Electrochemical Science* 6 (2011) 2898-2904.
11. L.Y. Chin, Z. Zainal, M.Z. Hussein, T.W. Tee, Fabrication of Highly Ordered TiO_2 Nanotubes from Fluoride Containing Aqueous Electrolyte by Anodic Oxidation and Their Photoelectrochemical Response, *Journal of Nanoscience and Nanotechnology* 11 (2011) 4900-4909.
12. Ebrahimiasl, S., W. M. Z. W. Yunus, A. Kassim, and Z. Zainal. 2011. Synthesis of nanocrystalline SnO_x ($x = 1-2$) thin film using a chemical bath deposition method with improved deposition time, temperature and pH. *Sensors* 11, (10): 9207-9216.
13. Hussein, M. Z., N. Hashim, A. Hj Yahaya, and Z. Zainal. 2011. Synthesis of dichlorprop-Zn/Al-hydroxalcite nanohybrid and its controlled release property. *Sains Malaysiana* 40, (8): 887-896.
14. Ing, Y. C., Z. Zainal, A. Kassim, and W. M. M. Yunus. 2011. Electrochemical preparation of bilayer p-n junction of n-CdS / p-P3HT. *International Journal of Electrochemical Science* 6, (7): 2898-2904.
15. Nazarudin, M. F., I. Hamadneh, W. T. Tan, and Z. Zainal. 2011. The effect of sintering temperature variation on the superconducting properties of $\text{ErBa}_2\text{Cu}_3\text{O}_{7-\delta}$ superconductor prepared via coprecipitation method. *Journal of Superconductivity and Novel Magnetism* 24, (5): 1745-1750.
16. Shing, O. P., T. Y. Ping, T. -Y Y. Hin, and Z. Zainal. 2011. Synthesis and ionic conductivity of mechanically synthesized yttrium-doped ceria solid solutions. *Journal of Applied Sciences* 11, (7): 1285-1290.
17. Zidan, M., W. Tan, A. H. Abdullah, Z. Zainal, and J. K. Goh. 2011. Electrocatalytic oxidation of paracetamol mediated by lithium doped microparticles $\text{Bi}_2\text{O}_3/\text{MWCNT}$ modified electrode. *Asian Journal of Chemistry* 23, (7): 3029-3032.
18. Zidan, M., T. W. Tee, A. H. Abdullah, Z. Zainal, and G. J. Kheng. 2011. Electrochemical oxidation of ascorbic acid mediated by Bi_2O_3 microparticles modified glassy carbon electrode. *International Journal of Electrochemical Science* 6, (2): 289-300.
19. Zobir, S. A. M., A. B. Suriani, Z. Khusaimi, H. Mamat, Z. Zainal, S. H. Sarijo, and M. Rusop. 2011. Palm oil as the carbon source for the synthesis of carbon nanotubes using floating catalyst - chemical vapour deposition method. *AIP Conference Proceedings* 1328, : 180-182.
20. Zobir, S. A. M., Z. Zainal, S. H. Sarijo, and M. Rusop. 2011. Properties of amorphous carbon microspheres synthesised by palm oil-CVD method. *AIP Conference Proceedings* 1328, : 177-179.
21. Sarijo, S. H., Hussein, M. Z., Yahaya, A. H. J., & Zainal, Z. (2010). Effect of incoming and outgoing exchangeable anions on the release kinetics of phenoxyherbicides nanohybrids. *Journal of Hazardous Materials*, 182(1-3), 563-569.

22. Tan, K. B., Khaw, C. C., Lee, C. K., Zainal, Z., & Miles, G. C. (2010). Structures and solid solution mechanisms of pyrochlore phases in the systems Bi₂O₃-ZnO-(nb, ta)₂O₅. *Journal of Alloys and Compounds*, 508(2), 457-462.
23. Zobir, S. A. M., Zainal, Z., & Hussein, M. Z. (2010). The effect of polyvinyl alcohol addition on the physicochemical properties of ZnO synthesized by ethylene glycol-hydrothermal method. *Materials Chemistry and Physics*, 124(1), 477-481.
24. Hussein, M. Z., Jaafar, A. M., Yahaya, A. H., & Zainal, Z. (2010). Inorganic-based phytohormone delivery vector of 2-chloroethylphosphonate nanohybrid: A new stimulating compound with controlled release property to increase latex production. *Journal of Experimental Nanoscience*, 5(4), 310-318.
25. Gaya, U. I., Abdullah, A. H., Hussein, M. Z., & Zainal, Z. (2010). Photocatalytic removal of 2,4,6-trichlorophenol from water exploiting commercial ZnO powder. *Desalination*,
26. Ebrahimiasl, S., Zin Wan Yunus, W. M., Kassim, A., & Zainal, Z. (2010). Prediction of grain size, thickness and absorbance of nanocrystalline tin oxide thin film by taguchi robust design. *Solid State Sciences*, 12(8), 1323-1327.
27. Hussein, M. Z., Hashim, N., Yahaya, A. H., & Zainal, Z. (2010). Synthesis and characterization of [4-(2,4-dichlorophenoxybutyrate)-zinc layered hydroxide] nanohybrid. *Solid State Sciences*, 12(5), 770-775.
28. Sarijo, S. H., Hussein, M. Z. B., Yahaya, A. H., Zainal, Z., & Yarmo, M. A. (2010). Synthesis of phenoxyherbicides-intercalated layered double hydroxide nanohybrids and their controlled release property. *Current Nanoscience*, 6(2), 199-205.
29. Zidan, M., TAN, W., Zainal, Z., Abdullah, A. H., & Goh, J. K. (2010). Electrocatalytic oxidation of ascorbic acid mediated by lithium doped microparticles Bi₂O₃/MWCNT modified glassy carbon electrode. *International Journal of Electrochemical Science*, 5(4), 501-508.
30. Weetee, T. A. N., Zidan, M., Zainal, Z., Abdullah, A. H., & Kheng Goh, J. O. O. (2010). Electrocatalytic oxidation of ascorbic acid mediated by ZNO microcrystalline modified glassy carbon electrode. *Oriental Journal of Chemistry*, 26(1), 45-52.
31. Sarijo, S. H., Hussein, M. Z., Zainal, Z., & Yahaya, A. H. (2009). The effect of zinc to aluminium molar ratio on the formation of zinc-aluminium-4- chlorophenoxyacetate nanocomposite. Paper presented at the , 1136 449-453.
32. Hussein, M. Z., Jaafar, A. M., Yahaya, A. H., & Zainal, Z. (2009). The effect of single, binary and ternary anions of chloride, carbonate and phosphate on the release of 2,4-dichlorophenoxyacetate intercalated into the zn-al-layered double hydroxide nanohybrid. *Nanoscale Research Letters*, 4(11), 1351-1357.
33. Ong, S. T, Lee, C. K., & Zainal, Z. (2009). A comparison of sorption and photodegradation study in the removal of basic and reactive dyes. *Australian Journal of Basic and Applied Sciences*, 3(4), 3408-3416.
34. Taufiq-Yap, Y. H., Wong, Y. C., Zainal, Z., & Hussein, M. Z. (2009). Synthesis of self-assembled nanorod vanadium oxide bundles by sonochemical treatment. *Journal of Natural Gas Chemistry*, 18(3), 312-318.
35. Gaya, U. I., Abdullah, A. H., Zainal, Z., & Hussein, M. Z. (2009). Photocatalytic treatment of 4-chlorophenol in aqueous ZnO suspensions: Intermediates, influence of dosage and inorganic anions. *Journal of Hazardous Materials*, 168(1), 57-63.
36. Hamadneh, I., Ahmad, A. M., Wahid, M. H., Zainal, Z., & Abd-Shukor, R. (2009). Effect of nano-sized oxalate precursor on the formation of GdBa₂Cu₃O_{7-δ} phase via coprecipitation method. *Modern Physics Letters B*, 23(16), 2063-2068.
37. Zainal, Z., Hui, L. K., Hussein, M. Z., Abdullah, A. H., & Hamadneh, I. (K.). R. (2009). Characterization of TiO₂-Chitosan/Glass photocatalyst for the removal of a monoazo dye via photodegradation-adsorption process. *Journal of Hazardous Materials*, 164(1), 138-145.
38. Tan, K. B., Khaw, C. C., Lee, C. K., Zainal, Z., & Shaari, H. (2009). Phase formation and dielectric properties of pentavalent cation doped non-stoichiometric bismuth zinc niobate (BZN) cubic pyrochlore. *Sains Malaysiana*, 38(2), 219-226.
39. Hussein, M. Z. B., Hashim, N., Yahaya, A. H., & Zainal, Z. (2009). Controlled release formulation of agrochemical pesticide based on 4-(2,4-dichlorophenoxy)butyrate nanohybrid. *Journal of Nanoscience and Nanotechnology*, 9(3), 2140-2147.

40. Lee, C. K., Ong, S. T., & Zainal, Z. (2008). Ethylenediamine modified rice hull as a sorbent for the removal of basic blue 3 and reactive orange 16. *International Journal of Environment and Pollution*, 34(1-4), 246-260.
41. Anuar, K., Zainal, Z., Saravanan, N., & Asikin, N. (2008). Preparation of zinc-sulfide thin films in the presence of sodium tartrate as a complexing agent. *Materials Science*, 44(2), 290-293.
42. Hussein, M. Z., Sarijo, S. H., Yahaya, A. H., & Zainal, Z. (2007). The effect of pH on the formation of host-guest type material: Zinc-aluminium-layered double hydroxide-4-chlorophenoxy acetate nanocomposite. *Physica Status Solidi (C) Current Topics in Solid State Physics*, 4(2), 611-613.
43. Ong, S. T., Lee, C. K., & Zainal, Z. (2007). Removal of basic and reactive dyes using ethylenediamine modified rice hull. *Bioresource Technology*, 98(15), 2792-2799.
44. Khaw, C. C., Lee, C. K., Zainal, Z., Miles, G. C., & West, A. R. (2007). Pyrochlore phase formation in the system Bi₂O₃-ZnO-Ta₂O₅. *Journal of the American Ceramic Society*, 90(9), 2900-2904.
45. Josephine, L. Y. C., Talib, Z. A., Yunus, W. M. M., Zainal, Z., Moksini, M. M., Lim, K. P., et al. (2007). Structural and thermal diffusivity studies of polycrystalline (CuSe) 1-XXeX metal chalcogenide compound. Paper presented at the , 909 243-247.
46. Hussein, M. Z. B., Sarijo, S. H., Yahaya, A. H., & Zainal, Z. (2007). Synthesis of 4-chlorophenoxyacetate-zinc-aluminium-layered double hydroxide nanocomposite: Physico-chemical and controlled release properties. *Journal of Nanoscience and Nanotechnology*, 7(8), 2852-2862.
47. Isha, A., Yusof, N. A., Ahmad, M., Suhendra, D., Yunus, W. M. Z. W., & Zainal, Z. (2007). Optical fibre chemical sensor for trace vanadium(V) determination based on newly synthesized palm based fatty hydroxamic acid immobilized in polyvinyl chloride membrane. *Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy*, 67(5), 1398-1402.
48. Zainal, Z., Lee, C. Y., Hussein, M. Z., Kassim, A., & Yusof, N. A. (2007). Electrochemical-assisted photodegradation of mixed dye and textile effluents using TiO₂ thin films. *Journal of Hazardous Materials*, 146(1-2), 73-80.
49. Zainal, Z., Lee, C. Y., Kassim, A., Hussein, M. Z., & Yusof, N. A. (2007). Photoelectrochemical degradation of methyl orange using TiO₂/Ti films prepared via sol-gel technique. *Acta Chimica Slovenica*, 54(1), 166-174.
50. Prabakaran, S. R. S., Vimala, R., & Zainal, Z. (2006). Nanostructured mesoporous carbon as electrodes for supercapacitors. *Journal of Power Sources*, 161(1), 730-736.
51. Ekramul Mahmud, H. N. M., Kassim, A., Zainal, Z., & Yunus, W. M. M. (2006). Fourier transform infrared study of polypyrrole - poly(vinyl alcohol) conducting polymer composite films: Evidence of film formation and characterization. *Journal of Applied Polymer Science*, 100(5), 4107-4113.
52. Isha, A., Yusof, N. A., Ahmad, M., Suhendra, D., Yunus, W. M. Z. W., & Zainal, Z. (2006). A chemical sensor for trace V(V) ion determination based on fatty hydroxamic acid immobilized in polymethylmethacrylate. *Sensors and Actuators, B: Chemical*, 114(1), 344-349.
53. Zainal, Z., & Lee, C. Y. (2006). Properties and photoelectrocatalytic behaviour of sol-gel derived TiO₂ thin films. *Journal of Sol-Gel Science and Technology*, 37(1), 19-25.
54. Hussein, M. Z. B., Yahaya, A. H., Zainal, Z., & Kian, L. H. (2005). Nanocomposite-based controlled release formulation of an herbicide, 2,4-dichlorophenoxyacetate encapsulated in zinc-aluminium-layered double hydroxide. *Science and Technology of Advanced Materials*, 6(8), 956-962.
55. Zainal, Z., Hui, L. K., Hussein, M. Z., Taufiq-Yap, Y. H., Abdullah, A. H., & Ramli, I. (2005). Removal of dyes using immobilized titanium dioxide illuminated by fluorescent lamps. *Journal of Hazardous Materials*, 125(1-3), 113-120.
56. Tan, K. B., Lee, C. K., Zainal, Z., Miles, G. C., & West, A. R. (2005). Stoichiometry and doping mechanism of the cubic pyrochlore phase in the system Bi₂O₃-ZnO-Nb₂O₅. *Journal of Materials Chemistry*, 15(34), 3501-3506.
57. Zainal, Z., Chong, Y., Hussein, M. Z., Kassim, A., & Yusof, N. A. (2005). Effect of pH on structural, electrochemical and photoelectrocatalytic degradation properties of methyl orange. *Asian Journal of Chemistry*, 17(3), 1717-1728.

58. Hussein, M. Z. B., Long, C. W., Zainal, Z., & Yahaya, A. H. (2005). Synthesis of organic-inorganic hybrid nanocomposite material: Alizarin-3-sulfonate in the lamella of zinc-aluminium-layered double hydroxide. Paper presented at the , 5650 548-556.
59. Zainal, Z., Lee, C. Y., Hussein, M. Z., Kassim, A., & Yusof, N. A. (2005). Effect of supporting electrolytes in electrochemically-assisted photodegradation of an azo dye. *Journal of Photochemistry and Photobiology A: Chemistry*, 172(3), 316-321.
60. Anuar, K., Zainal, Z., Saravanan, N., & Hamizi, S. N. (2005). Effect of solution concentration and deposition period on the properties of NiS₂ thin films. *Journal of the Indian Chemical Society*, 82(6), 526-529.
61. Zainal, Z., Nagalingam, S., & Hua, T. M. (2005). Properties of tin sulphide thin films electrodeposited in the presence of triethanolamine. *Journal of Materials Science: Materials in Electronics*, 16(5), 281-285.
62. Zainal, Z., Nagalingam, S., & Loo, T. C. (2005). Copper selenide thin films prepared using combination of chemical precipitation and dip coating method. *Materials Letters*, 59(11), 1391-1394.
63. Zainal, Z., Lee, C. Y., Hussein, M. Z., Kassim, A., & Yusof, N. A. (2005). Electrochemical-assisted photodegradation of dye on TiO₂ thin films: Investigation on the effect of operational parameters. *Journal of Hazardous Materials*, 118(1-3), 197-203.
64. Zainal, Z., Saravanan, N., & Mien, H. L. (2005). Electrodeposition of nickel selenide thin films in the presence of triethanolamine as a complexing agent. *Journal of Materials Science: Materials in Electronics*, 16(2), 111-117.
65. Kassim, A., Joseph, C. G., Zainal, Z., Hussein, M. Z., Haron, M. J., & Abdullah, A. H. (2004). Activated carbons prepared from oil palm shells: Application for column separation of heavy metals. *Journal of the Indian Chemical Society*, 81(11), 946-949.
66. Irmawati, R., Razali, M. A., Taufiq-Yap, Y. H., & Zainal, Z. (2004). Effect of calcination temperatures on physicochemical properties of vanadium-antimony mixed oxide catalysts. *Catalysis Today*, 93-95, 631-637.
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73. Tang, P. L., Lee, C. K., Low, K. S., & Zainal, Z. (2003). Sorption of Cr(VI) and Cu(II) in aqueous solution by ethylenediamine modified rice hull. *Environmental Technology*, 24(10), 1243-1251.
74. Zainal, Z., Nagalingam, S., Kassim, A., Hussein, M. Z., & Yunus, W. M. M. (2003). Tin selenide thin films prepared through combination of chemical precipitation and vacuum evaporation technique. *Materials Science- Poland*, 21(2), 224-233.
75. Zainal, Z., Ali, A. J., Kassim, A., & Hussein, M. Z. (2003). Electrodeposition of tin selenide thin film semiconductor: Effect of the electrolytes concentration on the film properties. *Solar Energy Materials and Solar Cells*, 79(2), 125-132.
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