

Curriculum Vitae



Wen-Bin Yang 楊文彬

Research Specialist, Genomics Research Center

研究技師、基因體研究中心

Tel: 02-27871264

Email: wbyang@gate.sinica.edu.tw

Education and Positions

- B. S. in Chemistry, Chung Yuan Christian University, Taiwan R.O.C. 1989–1992.
- M. S. Department of Chemistry, National Chung Hsing University, 1992–1994.
- Ph. D. Department of Chemistry, National Taiwan University, 1994–1998.
- Postdoctoral Research Fellow, Institute of Biological Chemistry, Academia Sinica, 1998–2002.
- Assistant Professor, Graduate Institute of Pharmacognosy Science, Taipei Medical University, 2002–2003.
- Assistant Research Fellow, Genomics Research Center, Academia Sinica, 2003–2013.
- Associate Research Specialist, Genomics Research Center, Academia Sinica, 2013–2018.
- Senior Research Specialist, Genomics Research Center, Academia Sinica, 2018–present.

Honors

- Fellowship of Ministry of Education and NSC, 1992–1994.
- Graduate Fellowship of National Science Council (NSC), 1994–1998.
- The best research papers in *Journal of the Chinese Chemical Society*, 2000 and 2013.
- AS postdoctoral fellowship (生命科學組) in IBC of Academia Sinica, 1998–2002.

Community Activities

- Serve as a captain of AS soft-baseball team, Academic Sinica. (We got four champions at 2006, 2008, 2009 and 2010 in “The Presidential Soft-Baseball Championship, Taiwan, R.O.C.” (總統盃全國慢速壘球錦標賽) and some medals in “The Central Government Interagency Sports Competition” (中央機關公務人員運動會).
- Serve as a committeeman for 1st administrative committee of the academic activity center and gym, Academia Sinica, 2007–2008.
- 2023~加入中央研究院環境保護志工隊(生態池、森林步道及國家生技園區生態棲地維護)

Publications (2005–2025)

- Shie, J. J.; Fang, J. M.; Kuo, C. J.; Kuo, T. H.; Liang, P. H.; Huang, H. J.; Yang, W. B.; Lin, C. H.; Chen, J. L.; Wu, Y. T.; Wong, C. H., Discovery of potent anilide inhibitors against the severe acute respiratory syndrome 3CL protease. *J. Med. Chem.*, **2005**, 48, 4469–73.
- Lin, C. H.; Lin, H. C.; Yang, W. B., Exo-glycal chemistry: general aspects and synthetic applications for biochemical use. *Curr. Top. Med. Chem.*, **2005**, 5, 1431–57. Cheng, Y. S.; Lo, K. H.; Hsu, H. H.; Shao, Y. M.; Yang, W. B.; Lin, C. H.; Wong, C. H., Screening for HIV protease inhibitors by protection against activity-mediated cytotoxicity in *Escherichia coli*. *J Virol Methods* **2006**, 137, (1), 82–87.
- Lin, K. I.; Kao, Y. Y.; Kuo, H. K.; Yang, W. B.; Chou, A.; Lin, H. H.; Yu, A. L.; Wong, C. H., Reishi Polysaccharides Induce Immunoglobulin Production through the TLR4/TLR2-mediated Induction of Transcription Factor Blimp-1. *J. Biol. Chem.*, **2006**, 281, (34), 24111–24123.
- Chang, W. C.; Huang, L. C. L.; Wang, Y. S.; Peng, W. P.; Chang, H. C.; Hsu, N. Y.; Yang, W. B.; Chen, C. H., Matrix-assisted laser desorption/ionization (MALDI) mechanism revisited. *Anal.*

Chim. Acta., **2007**, 582, 1-9.

- Huang, H. J.; Yang, W. B., Synthesis of moenocinol and its analogs using BT-sulfone in Julia-Kocienski olefination. *Tetrahedron Lett.*, **2007**, 48, 1429-1433.
- Hsu, N. Y.; Yang, W. B.; Wong, C. H.; Lee, Y. C.; Lee, R. T.; Wang, Y. S.; Chen, C. H., Matrix-assisted laser desorption/ionization mass spectrometry of polysaccharides with 2',4',6'-trihydroxyacetophenone as matrix. *Rapid Commun. Mass Spectrom.*, **2007**, 21, 2137-2146.
- Shao, Y. M.; Yang, W. B.; Peng, H. P.; Hsu, M. F.; Tasi, K. C.; Kuo, T. H.; Yang, A. S.; Wang, A. H. J.; Liang, P. H.; Lin, C. H.; Wong, C. H., Structure-based design and synthesis of highly potent SARS-CoV 3CL protease inhibitors. *ChemBioChem.*, **2007**, 8, 1654-1657.
- Hua, K. F.; Hsu, H. Y.; Chao, L. K.; Chen, S. T.; Yang, W. B.; Hsu, J.; Wong, C. H., *Ganoderma lucidum* polysaccharides enhance CD14 endocytosis of LPS and promote TLR4 signal transduction of cytokine expression. *J. Cell. Phy.*, **2007**, 212, (2), 537-550.
- Cheng, K. C.; Huang, H. C.; Chen, J. H.; Hsu, J. W.; Cheng, H. C.; Ou, C. H.; Yang, W. B.; Chen, S. T.; Wong, C. H.; Juan, H. F., *Ganoderma lucidum* polysaccharides in human monocytic leukemia cells: from gene expression to network construction. *BMC Genomics*, **2007**, 8:411.
- Lin, C.; Lai, P. T.; Liao, K. S.; Hung, W. T.; Yang, W. B.; Fang, J. M., Using molecular iodine in direct oxidative condensation of aldoses with diamines: An improved synthesis of aldo-benzimidazoles and aldo-naphthimidazoles for carbohydrate analysis. *J. Org. Chem.*, **2008**, 73, 3848-3853.
- Hsieh, Yves S. Y.; Chien, C.; Liao, Sylvian K. S.; Liao, S. F.; Hung, W. T.; Yang, W. B.; Lin, C. C.; Cheng, Rachel T. J.; Chang, C. C.; Fang, J. M.; Wong, C. H., Structure and bioactivity of the polysaccharides in medicinal plant *Dendrobium huoshanense*. *Bioorg. Med. Chem.*, **2008**, 16, 6054-6068.
- Hung, W. T.; Wang, S. H.; Chen, C. H.; Yang, W. B., Structure determination of beta-glucans from *Ganoderma lucidum* with matrix-assisted laser desorption/ionization (MALDI) mass spectrometry. *Molecules*, **2008**, 13, 1538-1550.
- Shao, Y. M.; Yang, W. B.; Kuo, T. H.; Tsai, K. C.; Lin, C. H.; Yang, A. S.; Liang, P. H.; Wong, C. H., Design, synthesis, and evaluation of trifluoromethyl ketones as inhibitors of SARS-CoV 3CL protease. *Bioorg. Med. Chem.*, **2008**, 16, 4652-4660.
- Chen, M. L.; Adak, A. K.; Yeh, N. C.; Yang, W. B.; Chuang, Y. J.; Wong, C. H.; Hwang, K. C.; Hwu, J. R.; Hsieh, S. L.; Lin, C. C., Fabrication of an oriented Fc-fused lectin microarray through boronate formation. *Angew. Chem. Int. Ed.*, **2008**, 47, 8627-8630.
- Chuang, M. H.; Chiou, S. H.; Huang, C. H.; Yang, W. B.; Wong, C. H., The lifespan-promoting effect of acetic acid and Reishi polysaccharide. *Bioorg. Med. Chem.*, **2009**, 17, 7831-7840.
- Huang, Y. T.; Lyu, S. Y.; Chuang, P. H.; Hsu, N. S.; Li, Y. S.; Chan, H. C.; Liu, Y. C.; Wu, C. J.; Yang, W. B.; Li, T. L., In vitro characterization of enzymes involved in the synthesis of nonproteinogenic residue (2S,3S)-beta-methylphenylalanine in glycopeptide antibiotic mannopeptimycin. *ChemBioChem.*, **2009**, 10, 2480-2487.
- Hsu, T. L.; Cheng, S. C.; Yang, W. B.; Chin, S. W.; Chen, B. H.; Huang, M. T.; Hsieh, S. L.; Wong, C. H., Profiling carbohydrate-receptor interaction with recombinant innate immunity receptor-Fc fusion proteins. *J. Biol. Chem.*, **2009**, 284, 34479-34489.
- Hsieh, Yves. S. Y.; Liao, S. F.; Yang, W. B., Biologically active polysaccharides in medicinal plants. *New Zealand Journal of Forestry Science* **2009**, 39, 217-223.
- Lin, C.; Hung, W. T.; Chen, C. H.; Fang, J. M.; Yang, W. B., A new naphthimidazole derivative for saccharide labeling with enhanced sensitivity in mass spectrometry detection. *Rapid Commun. Mass Spectrom.*, **2010**, 24, 85-94.
- Chang, C. C.; Ku, A. F.; Tseng, Y. Y.; Yang, W. B.; Fang, J. M.; Wong, C. H., 6,8-Di-C-glycosyl flavonoids from *Dendrobium huoshanense*. *J. Nat. Prod.*, **2010**, 73, 229-232.

- Lin, C.; Hung, W. T.; Kuo, C. Y.; Liao, K. S.; Liu, Y. C.; Yang, W. B., I₂-catalyzed oxidative condensation of aldoses with diamines: synthesis of aldo-naphthimidazoles for carbohydrate analysis. *Molecules*, **2010**, *15*, 1340-1353.
- Lai, C. Y.; Hung, J. T.; Lin, H. H.; Yu, A. L.; Chen, S. H.; Tsai, Y. C.; Shao, L. E.; Yang, W. B.; Yu, J., Immunomodulatory and adjuvant activities of a polysaccharide extract of *Ganoderma lucidum* in vivo and in vitro. *Vaccine*, **2010**, *28*, 4945-4954.
- Chen, W. Y.; Yang, W. B.; Wong, C. H.; Shih, Daniel T. B., Effect of Reishi polysaccharides on human stem/progenitor cells. *Bioorg. Med. Chem.*, **2010**, *18*, 8583-8591.
- Wu, M. H.; Lee, Y. C.; Tsai, W. J.; Yang, W. B.; Chen, Y. C.; Chuang, K. A.; Liao, J. F.; Wang, C. C.; Kuo, Y. C., Characterized polysaccharides from black soybean induce granulocyte colony-stimulated factor gene expression in a phosphoinositide 3-kinase-dependent manner. *Immunol. Invest.*, **2011**, *40*, Sep. 39-61.
- Lin, C.; Kuo, C. Y.; Liao, K. S.; Yang, W. B., Monosaccharide-NAIM derivatives for D-, L-configuration analysis. *Molecules*, **2011**, *16*, 652-664.
- Chang, Y. L.; Liao, K. S.; Chen, Y. C.; Hung, W. T.; Yu, H. M.; Yang, W. B.; Fang, J. M.; Chen, C. H.; Lee, Y. C., Tagging saccharides for signal enhancement in mass spectrometric analysis. *J. Mass Spectrom.*, **2011**, *46*, 247-255.
- Kuo, C. Y.; Liao, K. S.; Liu, Y. C.; Yang, W. B., Bis-indole derivatives for polysaccharides composition analysis and chiral resolution of D-, L-monosaccharide by ligand exchange CE using borate-CD as a chiral selector. *Molecules*, **2011**, *16*, 1682-1694.
- Wang, S. H.; Yang, W. B.; Liu, Y. C.; Chiu, Y. H.; Chen, C. T.; Kao, P. F.; Lin, C. M., A potent sphingomyelinase inhibitor from *Cordyceps mycelia* contributes to its cytoprotective effect against oxidative stress in macrophages. *J. Lipid Res.*, **2011**, *52*, 471-479.
- Chang, Y. L.; Lee, Y. C.; Yang, W. B.; Chen, C. H., Ionic liquid assisted electrospray ionization of polysaccharides. *J. Mass Spectrom.*, **2011**, *46*, 367-375.
- Lee, T. H.; Lu, C. K.; Wang, G. J.; Chang, Y. C.; Yang, W. B.; Ju, Y. M., Sesquiterpene glycosides from *Cosmospora joca*. *J. Nat. Prod.*, **2011**, *74*, 1561-1567.
- Kao, P. F.; Wang, S. H.; Hung, W. T.; Liao, Y. H.; Lin, C. M.; Yang, W. B., Structural characterization and anti-oxidative activity of low molecular weight beta-1,3-glucan from the residue of extracted *Ganoderma lucidum* fruiting bodies. *J. Biomed. Biotech.*, **2012**, Article ID 673764, 8 pages.
- Wang, G. J.; Liang, W. L.; Ju, Y. M.; Yang, W. B.; Chang, Y. W.; Lee, T. H. Inhibitory effects of terpenoids from the fermented broth of the ascomycete *Stilbohypoxyloa elaeicola* YMJ173 on nitric oxide production in RAW264.7 macrophages. *Chemistry & Biodiversity*, **2012**, *9*, 131-138.
- Kuo, C. Y.; Wang, S. H.; Lin, C.; Liao, K. S.; Hung, W. T.; Fang, J. M.; Wong, C. H.; Yang, W. B.*, Application of 2,3-naphthalenediamine in labeling natural carbohydrates for capillary electrophoresis. *Molecules*, **2012**, *17*, 7387-7400.
- Hung, W. T.; Wang, S. H.; Chen, Y. T.; Yu, H. M.; Chen, C. H.; Yang, W. B.*, MALDI-TOF analysis of natural polysaccharides and permethylation/benzimidazole derivatived polysaccharides. *Molecules*, **2012**, *17*, 4950-4961.
- Hung, W. T.; Wang, S. H.; Chen, C. H.; Chen, C. H.; Fang, J. M.*; Yang, W. B.*, Tagging N-linked glycan with 2,3-naphthalenediamine for mass spectrometric analysis. *J. Chin. Chem. Soc.*, **2013**, *60*, 995-960. This article was elected as Best Article Award 2013 of J. Chin. Chem. Soc.
- Ohara, K.; Lin, C. C.; Yang, P. J.; Hung, W. T.; Yang, W. B.; Cheng, T. J.; Fang, J. M.; Wong, C. H., Synthesis and bioactivity of β -(1 $\rightarrow$ 4)-linked oligomannoses and partially acetylated derivatives. *J. Org. Chem.*, **2013**, *78*, 6390-6411.
- Liao, S. F.; Liang, C. H.; Ho, M. Y.; Hsu, T. L.; Tsai, T. I.; Hsieh, Yves S. Y.; Tsai, C. M.; Li, S. T.; Cheng, Y. Y.; Tsao, S. M.; Lin, T. Y.; Lin, Z. Y.; Yang, W. B.; Ren, C. T.; Lin, K. I.; Khoo, K. H.; Lin, C. H.; Hsu, H. Y.; Wu, C. Y.; Wong, C. H., Immunization of

fucose-containing polysaccharides from Reishi mushroom induces antibodies to tumor-associated Globo H-series epitopes. *Proc Natl Acad Sci USA*, **2013**, *110*, 13809-13814.

- Lin, J. W.; Chang, Y. J.; Yang, W. B.; Yu, A. L.; Wong, C. H., The multifaceted effects of polysaccharides isolated from *Dendrobium huoshanense* on immune functions with the induction of interleukin-1 receptor antagonist (IL-1ra) in monocytes. *PLOS ONE*, **2014**, *9*, e94040.
- Huang, Y. L.; Pai, F. S.; Tsou, Y. T.; Mon, H. C.; Hsu, T. L.; Wu, C. Y.; Chou, T. Y.; Yang, W. B.; Chen, C. H.; Wong, C. H.; Hsieh, S. L., Human CLEC18 gene cluster contains C-type lectins with differential glycan-binding specificity. *J. Biol. Chem.* **2015**, *290*, 21252-21263.
- Cheung, S. K. C.; Chuang, P. K.; Huang, H. W.; Hwang-Verslues, W. W.; Cho, C. H. H.; Yang, W. B.; Shen, C. N.; Hsiao, M.; Hsu, T. L.; Chang, C. F.; Wong, C. H., Stage-specific embryonic antigen-3 (SSEA-3) and β 3GalT5 are cancer specific and significant markers for breast cancer stem cells. *Proc Natl Acad Sci USA*, **2016**, *114*, 960-965.
- Yen, T. L.; Wu, M. P.; Chung, C. L.; Yang, W. B.; Jayakumar, T.; Geraldine, P.; Chou, C. M.; Chang, C. Y.; Lu, W. J.; Sheu, J. R., Novel synthetic benzimidazole-derived oligosaccharide, M3BIM, prevents ex vivo platelet aggregation and in vivo thromboembolism. *J Biomed Sci.* **2016**, 23:26.
- Hung, W. T.; Chen, Y. T.; Wang, S. H.; Liu, Y. C.; Yang, W. B.*, A new method for aldo-sugar analysis in beverages and dietary foods. *Functional Foods in Health and Disease*. **2016**, *6*, 234-245.
- Cheng, W. C.; Wang, J. H.; Li, H. Y.; Lu, S. J.; Hu, J. M.; Yun, W. Y.; Chiu, C. H.; Yang, W. B.; Chien, Y. H.; Hwu, W. L. Bioevaluation of sixteen ADMDP stereoisomers toward alpha-galactosidase A: Development of a new pharmacological chaperone for the treatment of Fabry disease and potential enhancement of enzyme replacement therapy efficiency. *Eur. J. Med. Chem.* **2016**, *123*, 14-20.
- Hsieh, C. C.; Shyr, Y. M.; Liao, W. Y.; Chen, T. H.; Wang, S. E.; Lu, P. C.; Lin, P. Y.; Chen, Y. B.; Mao, W. Y.; Han, H. Y.; Hsiao, M.; Yang, W. B.; Li, W. S.; Sher, Y. P.; Shen, C. N. Elevation of β -galactoside α 2,6-sialyltransferase 1 in a fructose-responsive manner promotes pancreatic cancer metastasis. *Oncotarget* **2017**, *8*, 7691-709.
- Chen, Y. T.; Wang, S. H.; Hung, W. T.; Fang, J. M.*; Yang, W. B.*, Quantitative analysis of sugar ingredients in beverages and food crops by an effective method combining naphthimidazole derivatization and ^1H -NMR spectrometry. *Functional Foods in Health and Disease*. **2017**, *7*, 494-510.
- Chen, S. T.; Li, F. J.; Hsu, T. Y.; Liang, S. M.; Yeh, Y. C.; Liao, W. Y.; Chou, T. Y.; Chen, N. J.; Hsiao, M.; Yang, W. B.; Hsieh, S. L. CLEC5A is a critical receptor in innate immunity against *Listeria* infection. *Nat. Commun.* **2017**, *8*:299.
“This article was selected as significant research achievements of **Academia Sinica 2017**”
- Yao, W. C.; Yuan, L. T.; Yang, W. B.; Hsia, C. H.; Huang, L. T.; Lee, T. Y.; Sheu, J. R.; Lu, W. J.; Jayakumar, T.; Chen, R. J. Development of benzimidazole derivatives as novel anti-platelet drugs. *Curr. Pharma. Biotechnol.* **2017**, *18*, 594-605.
- Chang, Y.; Hsu, W. H.; Yang, W. B.; Jayakumar, T.; Lee, T. Y.; Sheu, J. R.; Lu, W. J.; Li, J. Y., Structure-activity relationship of three synthesized benzimidazole-based oligosaccharides in human platelet activation. *Int. J. Mol. Med.* **2017**, *40*, 1520-1528.
- Hung, W. T.; Chen, Y. T.; Chen, C. H.; Lee, Y. C.; Fang, J. M.*; Yang, W. B.*Flow chemistry system for carbohydrate analysis by rapid labeling of saccharides after glycan hydrolysis. *SLAS Technology* **2020**, *25*, 356-366.
- Jan, J. T.; Cheng, T. J.; Juang, Y. P.; Ma, H. H.; Wu, Y. T.; Yang, W. B.; Cheng, C. W.; Chen, X.; Chou, T. H.; Shie, R. J.; Cheng, W. C.; Chein, R. J.; Mao, S. S.; Liang, P. H.; Ma, C.; Hung, S. C.; Wong, C. H. Identification of existing pharmaceuticals and herbal medicines as inhibitors of SARS-CoV-2 infection. *PNAS* **2021**, *118*, e2021579118.

- Tandem Mass Spectrometry “Tandem Mass Spectrometry of Tagged and Permethylated Polysaccharides” InTech Book 2011.
- qNMR as a Tool for Determination of Six Common Sugars in Foods. Applications of NMR Spectroscopy, 2019, Vol. 8, 1-24, CHAPTER 1.

Technology Licensing and Patents

- C.-H. Lin, W.-B. Yang, H.-C. Lin, “Glycosylation of exo-glycals. Patent No.: US 7,078,520 B2. Date of patent Jul. 18, 2006.
- C.-H. Wong, C.-H. Lin, C.-C. Lin, K.-H. Khoo, S.-T. Chen, Y.-Y. Wang, W.-B. Yang, “Preparation and composition analysis of Immuno-modulating of *Ganoderma lucidum* polysaccharides F3,” AS Docket Number: 28A-931014-1E. This patent had been licensed to Wyntek Biotech Cop. for commercial application and has a highest licensed royalty in Academia Sinica and the royalties were paid year by year since 2005.
- C.-H. Wong, H.-Y. Hsu, K.-F. Hua, C.-H. Lin, J. Hsu, S.-T. Chen, K.-I. Lin, W.-B. Yang, J. Yu, A. Yu, “Methods and compositions associated with administration of an extract of *Ganoderma lucidum*,” PCT Patent Application No. PCT/US2005/036961, Taiwan Patent Application No. 095131055 (2006), Japanese Patent Application No. 2007536927 (2007), European Patent Application No. 05810080.1 (2007).
- A. Yu, J. Yu, K.-I. Lin, W.-B. Yang, C.-H. Wong, “Fungal immunostimulatory compositions,” US Patent Application No. 11/549,215 (2006); “真菌免疫刺激組合物及其用途” (Docket Number 28A-941007-TW) has issued Taiwan patent No. I386220.
- C.-H. Wong, J.-M. Fang, W.-B. Yang, T.-J. R. Cheng, Y. S.-Y. Hsieh, C. Chien, C.-C. Lin, H.-Y. Wen, “Structure and bioactivity of the polysaccharides in medicinal plant *Dendrobium huoshanense*,” US Patent Application No. 12/378,263 (2009), PCT Patent Application No. PCT/US2009/033940 (2009), Taiwan Patent Application No. 098104560 (2009). Docket number 28A-970212-US, USA patent number: US 8,354,127B2, 2013/1/15.
- C.-H. Wong, M.-H. Chuang, W.-B. Yang, S.-H. Chiou, “Longevity-promoting effects of acetic acid and Reishi polysaccharide,” US Patent Application No. 12/425,319 (2009), PCT Patent Application No. PCT/US09/40879 (2009). This patent had been licensed to Wyntek Biotech Cop. for commercial application and the licensed royalties have paid to Academia Sinica year by year since 2009.
- Y.-J. Chen, J.-H. Chen, M.-Y. Liao, W.-B. Yang, K.-I. Lin, C.-H. Wong, “Proteomic profiles of immune cells induced by an extract of *Ganoderma lucidum*,” AS Docket Number: 28T-950912.
- J.-H. Chen, C.-Y. Yang, C.-H. Wong, W.-B. Yang, “Determination of binding targets of an extract of *Ganoderma lucidum* using phage display,” AS Docket Number: 28T-950913.
- S.-M. Liang, Y.-P. Chen, W.-B. Yang, C.-H. Wong, “Reishi F3 subfraction polysaccharides and methods of using same,” IPC8 Class: AC12N502F1, USPC Class: 435377, Patent application number: US 2009/0263897 A1.
- W.-B. Yang, “Aldo-MeIMs, new removable saccharide tags” AS Docket Number: 28A-1000513. Provisional US Patent Application No. 61/506,775.
- W.-B. Yang, “Synthesis of 1*H*-benzoimidazole and their derivatives by iodine catalytic condensation” AS Docket Number: 28A-1000923.
- W.-B. Yang, “Saccharide tagging reagents with *ortho*-phenyl diamine (OPD) conjugated peptides and OPD-peptide conjugated functional molecules” AS Docket Number: 28A-1010116; “Diaminobenzoic or *ortho*-phenylene diamine conjugated peptides as functional saccharide tagging reagents” ACA0073PRO No. 61/643,280.
- W.-B. Yang, “Diaminobenzoic or *ortho*-phenylene diamine conjugated peptides as functional saccharide tagging reagents”, WO 2013/169640 A1; PCT/US2013/039677.
- 二氨基苯甲酸或鄰苯二胺共軛的胜肽作為功能性的醣類標幟劑 “Diaminobenzoic or *ortho*-phenylene diamine conjugated peptides as functional saccharide tagging reagents”

ACA0074TW.

- “Compounds and methods for analysis and synthesis of saccharide compounds 用於醣類分析及合成的化合物及方法”, Taiwan Patent No. I547486. Date of patent 2016/9/1.
- ”Structure and bioactivity of the polysaccharides in medicinal plant *Dendrobium huoshanense* 藥用植物霍山石斛〈*Dendrobium huoshanense*〉多醣體及寡聚物之結構及生物活性”, Taiwan Patent No. I488636. Date of patent 2015/6/21.
- “Removable saccharide-benzimidazole (BIM) tags and conjugates thereof via 1H-position of the benzimidazoles”, USA Patent No. 9,086,416. Date of patent 2015/7/21.
- “Compounds and methods for analysis and synthesis of saccharide compounds, and method for quantitating saccharide”, 15/640,757 AS Docket Number: 28A-1011217B.
- “Flow chemistry system and method for carbohydrate analysis“, 28A-1080903 : IA0001/ACA0138PRO.
- 28A-1080903 「FLOW CHEMISTRY SYSTEM AND METHOD FOR CARBOHYDRATE ANALYSIS」中華民國（台灣）發明專利申請案第 110117499 號(IA0001/ACA0138TW)
- 28A-1090908 「METHODS FOR TREATING SARS-COV-2 INFECTION」

Grants

- NSC 2011/08-2012/07 (抗肺癌藥物開發—苯并咪唑類化合物之合成與活性篩選).
- NSC-100-2113-M-001-018 2011/08-2012/07 (Chinese herbs).
- NSC-99-2113-M-001-005 2010/08-2011/07 (Chinese herbs).
- NSC-98-2119-M-001-003 2009/08-2010/07 (Polysaccharides structures on Chinese herbs).
- NSC-92-2113-M-001-073 2003/08-2004/07 (Synthesis of bis-C-glycosides from *exo*-glycals).
- YFY Biotech 2005/04-2008/03 (Isolation polysaccharides from *Dendrobium huoshanense*).
- Wyntek Biotech 2007/09-2008/08 (Isolation polysaccharides from *Cordyceps sinensis*).
- Wyntek Biotech 2010/07-2011/06 (Anticancer activity of polysaccharides RF3 from *Ganoderma lucidum*).
- AS-94-TP-B10 2005/1-2007/12 (The immuno-functions of carbohydrates).
- GRC intramural funding 2004-2025 (for glycan sequencing and ChemBank/HTS).