

# ChiYung Yam 任志勇

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#### **Education**

09/1999 to 10/2003 Ph.D., The University of Hong Kong, Hong Kong09/1996 to 05/1999 B.Sc. in Chemistry with first class honor, The University of Hong Kong, Hong Kong

**Work Experience** 

09/2019 to now	Associate Professor, Beijing Computational Science Research Center, Beijing
03/2013 to 08/2019	Assistant Professor, Beijing Computational Science Research Center, Beijing
04/2010 to 03/2013	Research Assistant Professor, The University of Hong Kong, Hong Kong
04/2009 to 03/2010	Post-doctoral Fellow, University of Bremen, Bremen
02/2004 to 03/2009	Post-doctoral Fellow, The University of Hong Kong, Hong Kong

#### **Awards**

2014 NSFC Excellent Young Researcher Award

2013 1000 Young Talent Program of China

### **Research Grants**

2021 to 2024 NSFC General Program (Grant no. 22073007)

Title: Time-domain method development and its application for nanoscale

optoelectronic devices

Amount: 630K RMB Role: PI 2021 - 2024

2020 to 2022 Guangdong-Shenzhen Joint Key Project Funding (Grant no. 2019B1515120045)

Title: Multiscale Modeling of Optoelectronic Devices

Amount: 1M RMB Role: PI 2020 - 2022

2017 to 2020 NSFC General Program (Grant no. 21673017)

Title: Coupled Optical-Electrical Study of Plasmonic Nanoscale Solar Cells

Amount: 650K RMB Role: PI 2017 - 2020

2014 to 2016 NSFC Excellent Young Researcher (Grant no. 21322306)

Title: Multiscale Simulation of Complex Systems

Amount: 1M RMB Role: PI 2014 - 2016

2014 to 2019 National Basic Research Program of China (Grant no. 2014CB921402)

Title: Basic Device Physics of Solid-State Quantum Computing

Amount: 1.23M RMB Role: Co-I 2014 - 2019

# **Teaching Experience**

2020 – 2021	The University of Hong Kong Physical Chemistry: Introduction to Quantum Chemistry
2016 – 2019	Beijing Computational Science Research Center Graduate Course: Parallel Algorithms for Scientific Computing
Nov 2014	Hong Kong University of Science and Technology Guest Lectures: Quantum Chemistry
2010 – 2012	The University of Hong Kong Physical Chemistry I: Chemical Kinetics, Chemical Equilibrium

# **Five Representative Publications**

- Rulin Wang, Fuzhen Bi, Wencai Lu, Xiao Zheng and ChiYung Yam
   Tracking electron dynamics of single molecules in scanning tunneling microscopy junctions with laser pulses
  - J. Phys. Chem. Lett. 2021, 12, 6398-6404
- 2. Yuxiang Liu, Jin Zhang, Sheng Meng, **ChiYung Yam** and Thomas Frauenheim Electric field tunable ultrafast interlayer charge transfer in graphene/WS<sub>2</sub> heterostructure *Nano Lett.* 2021, 21 4403-4409
- 3. Xiaoyan Wu, Rulin Wang, Na Liu, Hao Zou, Bin Shao, Lei Shao and **ChiYung Yam**Controlling the emission frequency of graphene nanoribbon emitters based on spatially excited topological boundary states

Phys. Chem. Chem. Phys. 2020, 22, 8277-8283 (Front Cover)

- 4. Rulin Wang, Fuzhen Bi, Wencai Lu and **ChiYung Yam**Tunable photoresponse by gate modulation in bilayer graphene nanoribbon devices *J. Phys. Chem. Lett.* 2019, 10, 7719-7724
- Lingyi Meng, Yu Zhang and ChiYung Yam
   Multiscale study of plasmonic scattering and light trapping effect in silicon nanowire array solar cells

J. Phys. Chem. Lett. 2017, 8, 571-575

#### **Full Publication List**

1. Rulin Wang, Fuzhen Bi, Wencai Lu, Xiao Zheng and ChiYung Yam

Tracking electron dynamics of single molecules in scanning tunneling microscopy junctions with laser pulses

J. Phys. Chem. Lett. 2021, 12, 6398-6404

 Yuxiang Liu, Jin Zhang, Sheng Meng, ChiYung Yam and Thomas Frauenheim Electric field tunable ultrafast interlayer charge transfer in graphene/WS<sub>2</sub> heterostructure Nano Lett. 2021, 21 4403-4409

3. Ziyao Xu, Yi Zhou, **ChiYung Yam**, Lynn Gross, Antonietta De Sio, Thomas Frauenheim, Christoph Lienau and Guanhua Chen

Revealing generation, migration, and dissociation of electron-hole pairs and current emergence in an organic photovoltaic cell

Sci. Adv. 2021, 7, eabf7672

4. Baishun Yang, Bin Shao, Jianfeng Wang, Yang Li, **ChiYung Yam**, Shengbai Zhang and Bing Huang

Realization of semiconducting layered multiferroic heterojunctions via asymmetrical magnetoelectric coupling

Phys. Rev. B 2021, 103, L201405

 Sa Zhang, Jianfeng Wang, Shizheng Wen, Ming Jiang, Haiyan Xiao, Xiang Ding, Ning Wang, Menglu Li, Xiaotao Zu, Sean Li, **ChiYung Yam**, Bing Huang and Liang Qiao Approaching charge separation efficiency to unity without charge recombination *Phys. Rev. Lett.* 2021, 126, 176401

6. Xuelei Sui, Jianfeng Wang, ChiYung Yam and Bing Huang

Two-dimensional magnetic anionic electrons in electrides: generation and manipulation *Nano Lett.* 2021, 21, 3813-3819

7. Jia-Jia Yang, Xiang-Yang Liu, Zi-Wen Li, Thomas Frauenheim, **ChiYung Yam**, Wei-Hai Fang and Ganglong Cui

The spin-orbit interaction controls photoinduced interfacial electron transfer in fullerene-perovskite heterojunctions:  $C_{60}$  versus  $C_{70}$ 

Phys. Chem. Chem. Phys. 2021, 23, 6536-6543

8. Lingyi Meng and ChiYung Yam

Multiscale Quantum Mechanics/Electromagnetics Method for the Simulation of Photovoltaic Devices

Computational Materials, Chemistry, and Biochemistry: From Bold Initiatives to the Last Mile, page 693-715 (Springer, 2021)

9. Lei Cui, Rulin Wang, **ChiYung Yam**, GuanHua Chen and Xiao Zheng Quantum Mechanical Simulation of Electron Dynamics on Surfaces of Materials Computational Materials, Chemistry, and Biochemistry: From Bold Initiatives to the Last Mile, page115-136 (Springer, 2021) 10. Xiaoyan Wu, Rulin Wang, Na Liu, Hao Zou, Bin Shao, Lei Shao and ChiYung Yam

Controlling the emission frequency of graphene nanoribbon emitters based on spatially excited topological boundary states

Phys. Chem. Chem. Phys. 2020, 22, 8277-8283 (Front Cover)

11. Hai Bi, Carlos-Andres Palma, Yuxiang Gong, Klara Stallhofer, Matthias Nuber, Chao Jing, Felix Meggendorfer, Shizheng Wen, **ChiYung Yam**, Reinhard Kienberger, Mark Elbing, Marcel Mayor, Hristo Iglev, Johannes V Barth and Joachim Reichert

Electron-phonon coupling in current-driven single-molecule junctions

J. Am. Chem. Soc. 2020, 142, 3384-3391

12. Zhao Liu, **ChiYung Yam**, Shiwu Gao, Tao Sun and Dong-Bo Zhang

Lattice dynamics of twisted ZnO nanowires under generalized Born-von Karman boundary conditions

New J. Phys. 2020, 22 023004

13. Fuzhen Bi, **ChiYung Yam**, Chengjie Zhao, Le Liu, Min Zhao, Xiao Zheng and Tonggang Jiu Enhanced photocurrent in heterostructures formed between CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> perovskite films and graphdiyne

Phys. Chem. Chem. Phys. 2020, 22, 6239-6246

14. Shizheng Wen, Shiwu Gao and ChiYung Yam

Serial and parallel spin circuits at the molecular scale with two atomic-vacancies in graphene: Amplification of spin-filtering effect

Carbon 2020, 154, 357-362

15. Rulin Wang, Fuzhen Bi, Wencai Lu and ChiYung Yam

Tunable photoresponse by gate modulation in bilayer graphene nanoribbon devices

J. Phys. Chem. Lett. 2019, 10, 7719-7724

16. Ziyao Xu, Yi Zhou, Lynn Groß, Antonietta De Sio, **ChiYung Yam**, Christoph Lienau, Thomas Frauenheim and GuanHua Chen

Coherent real-space charge transport across a donor-acceptor interface mediated by vibronic couplings

Nano Lett. 2019, 19, 8630-8637

17. Bing Song, Limin Liu and ChiYung Yam

Suppressed carrier recombination in Janus MoSSe bilayer stacks: a time-domain ab initio study *J. Phys. Chem. Lett.* 2019 10, 5564-5570

18. Xiaoyan Wu, Rulin Wang, Yu Zhang, Bowen Song and ChiYung Yam

Controllable single-molecule light emission by selective charge injection in scanning tunneling microscopy

J. Phys. Chem. C 2019, 123, 15761-15768

19. Sateesh Bandaru, Ivan Scivetti, ChiYung Yam and Gilberto Teobaldi

The role of isotropic and anisotropic Hubbard corrections for the magnetic ordering and absolute band alignment of hematite  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> (0001) surfaces

Prog. Nat. Sci-Mater. 2019, 29, 349-355

Rulin Wang, Wencai Lu, Hang Xie, Xiao Zheng and ChiYung Yam
 Theoretical investigation of real-time charge dynamics in open systems coupled to bulk materials
 J. Chem. Phys. 2019, 150, 174119

#### 21. Fuzhen Bi, Xiao Zheng and ChiYung Yam

First-principles study of mixed cation methylammonium-formamidinium hybrid perovskite *Acta Phys-Chim Sin.* 2019, 35, 69-75

22. Govindarajan Saranya, ChiYung Yam, Shiwu Gao and Mingyang Chen

Roles of chenodeoxycholic acid coadsorbent in anthracene-based dye-sensitized solar cells: a density functional theory study

J. Phys. Chem. C 2018, 122, 23280-23287

23. Sateesh Bandaru, Govindarajan Saranya, Niall J. English, **ChiYung Yam** and Mingyang Chen Tweaking the electronic and optical properties of α-MoO<sub>3</sub> by sulphur and selenium doping–a density functional theory study

Sci. Rep. 2018, 8, 1-12

24. Shizheng Wen, Fei Gao, ChiYung Yam and Shiwu Gao

Nanomechanical control of spin current flip using monovacancy graphene *Carbon* 2018, 133, 218-223

25. Jia En Lu, Chou-Hsun Yang, Haobin Wang, **ChiYung Yam**, Zhi-Gang Yu and Shaowei Chen Plasmonic circular dichroism of vesicle-like nanostructures by the template-less self-assembly of achiral Janus nanoparticles

Nanoscale 2018, 10, 14586-14593

#### 26. Na Liu and ChiYung Yam

First-principles study of intrinsic defects in formamidinium lead triiodide perovskite solar cell absorbers

Phys. Chem. Chem. Phys. 2018, 20, 6800-6804

#### 27. Chou-Hsun Yang, **ChiYung Yam** and Haobin Wang

Approximate DFT-based methods for generating diabatic states and calculating electronic couplings: models of two and more states

Phys. Chem. Chem. Phys. 2018, 20, 2571-2584

28. Fuzhen Bi, Stanislav Markov, Rulin Wang, YanHo Kwok, Weijun Zhou, Limin Liu, Xiao Zheng, GuanHua Chen and **ChiYung Yam** 

Enhanced photovoltaic properties induced by ferroelectric domain structures in organometallic halide perovskites

J. Phys. Chem. C 2017, 121, 11151-11158

#### 29. Lingyi Meng, Yu Zhang and ChiYung Yam

Multiscale study of plasmonic scattering and light trapping effect in silicon nanowire array solar cells

J. Phys. Chem. Lett. 2017, 8, 571-575

30. Saranya Govindarajan, Shiwu Gao, Wei Cai and **ChiYung Yam** 

Rational design and first-principles studies of phenothiazine-based dyes for dye-sensitised solar cells

Mol. Phys. 2017, 115, 731-742

31. Rulin Wang, Yu Zhang, Fuzhen Bi, Thomas Frauenheim, GuanHua Chen and **ChiYung Yam**Quantum mechanical modeling the emission pattern and polarization of nanoscale light emitting diodes

Nanoscale 2016, 8, 13168-13173 (Back Cover)

32. Yu Zhang, **ChiYung Yam** and George C. Schatz

Fundamental limitations to plasmonic hot-carrier solar cells

J. Phys. Chem. Lett. 2016, 7, 1852-1858

33. Bang-Ming Ming, Ru-Zhi Wang, **ChiYung Yam**, Li-Chun Xu, Woon-Ming Lau and Hui Yan Bandgap engineering of GaN nanowires

AIP Adv. 2016, 6, 055018

34. Jianping Xiao, Liangzhi Kou, **ChiYung Yam**, Thomas Frauenheim and Binghai Yan Toward rational design of catalysts supported on a topological insulator substrate *ACS Catal.* 2016, 5, 7063-7067

35. Lingyi Meng, **ChiYung Yam**, Yu Zhang, Rulin Wang and GuanHua Chen

Multiscale modeling of plasmon-enhanced power conversion efficiency in nanostructured solar cells

J. Phys. Chem. Lett. 2015, 6, 4410-4416

36. Rulin Wang, Xiao Zheng, YanHo Kwok, Hang Xie, GuanHua Chen and ChiYung Yam

Time-dependent density functional theory for open systems with a positivity-preserving decomposition scheme for environment spectral functions

J. Chem. Phys. 2015, 142, 144112

37. Rulin Wang, Yu Zhang, GuanHua Chen and ChiYung Yam

Quantum mechanical modeling of electron-photon interactions in nanoscale devices

Prog. Electromagn. Res. 2015, 154, 163-170

38. Chuan-Jia Tong, Wei Geng, Zhen-Kun Tang, **ChiYung Yam**, Xiao-Li Fan, Jiang Liu, Woon-Ming Lau and Li-Min Liu

Uncovering the veil of the degradation in perovskite CH<sub>3</sub>NH<sub>3</sub>Pbl<sub>3</sub> upon humidity exposure: a first-principles study

J. Phys. Chem. Lett. 2015, 6, 3289-3295

39. Quan Chen, Jun Li, **ChiYung Yam**, Yu Zhang, Ngai Wong and GuanHua Chen

An approximate framework for quantum transport calculation with model order reduction

J. Comp. Phys. 2015, 286, 49-61

40. Yu Zhang, **ChiYung Yam**, YanHo Kwok and GuanHua Chen

A variational approach for dissipative quantum transport in a wide parameter space

J. Chem. Phys. 2015, 143, 104112

#### 41. Yu Zhang, ChiYung Yam and GuanHua Chen

Dissipative time-dependent quantum transport theory: quantum interference and phonon induced decoherence dynamics

J. Chem. Phys. 2015, 142, 164101

#### 42. ChiYung Yam, Lingyi Meng, Yu Zhang and GuanHua Chen

Multiscale quantum mechanics/electromagnetics method for device simulations

Chem. Soc. Rev. 2015, 44, 1763

43. Stanislav Markov, Balint Aradi, **ChiYung Yam**, Hang Xie, Thomas Frauenheim and GuanHua Chen

Atomic level modeling of extremely thin silicon-on-insulator MOSFETs including the silicon dioxide: Part I – Electronic Structure

IEEE Trans. Electron Dev. 2015, 62, 696-704

44. Hongping Yang, ChiYung Yam, Aihua Zhang, Zhiping Xu, Jun Luo and Jing Zhu

Discriminative modulation of the highest occupied molecular orbital energies of graphene and carbon nanotubes induced by charging

Phys. Chem. Chem. Phys. 2015, 17, 7248-7254

45. ShuGuang Chen, Yu Zhang, SiuKong Koo, Heng Tian, **ChiYung Yam**, GuanHua Chen and Mark A. Ratner

Interference and molecular transport - a dynamical view: time-dependent analysis of disubstituted benzenes

J. Phys. Chem. Lett. 2014, 5, 2748-2752

46. Yu Zhang, LingYi Meng, **ChiYung Yam** and GuanHua Chen

Quantum-mechanical prediction of nanoscale photovoltaics

J. Phys. Chem. Lett. 2014, 5, 1272-1277

#### 47. ChiYung Yam and GuanHua Chen

Linear-scaling computation of excited states in time-domain

Science China Chem. 2014, 57, 70-77

48. Jun Z. Huang, Lining Zhang, Weng Cho Chew, **ChiYung Yam**, Li Jun Jiang, GuanHua Chen and Mansun Chan

Model order reduction for quantum transport simulation of band-to-band tunneling devices *IEEE Trans. Electron Dev.* 2014, 61, 561-568

49. Lingyi Meng, Zhenyu Yin, **ChiYung Yam**, SiuKong Koo, Quan Chen, Ngai Wong and GuanHua Chen

Frequency-domain multiscale quantum mechanics/electromagnetics simulation method *J. Chem. Phys.* 2013, 139, 244111

- 50. YanHo Kwok, Hang Xie, **ChiYung Yam**, Xiao Zheng and GuanHua Chen Time-dependent density functional theory quantum transport simulation in non-orthogonal basis *J. Chem. Phys.* 2013, 139, 224111
- 51. Jianqiao Zhang, ZhenYu Yin, Xiao Zheng, **ChiYung Yam** and GuanHua Chen Gauge-invariant and current-continuous microscopic ac quantum transport theory *Eur. Phys. J. B* 2013, 86, 423
- 52. Jun Z. Huang, Weng Cho Chew, Jie Peng, **ChiYung Yam**, Li Jun Jiang and GuanHua Chen Model order reduction for multiband quantum transport simulations and its application to p-type junctionless transistors

IEEE Trans. Electron Dev. 2013, 60, 2111-2119

53. **ChiYung Yam**, Jie Peng, Quan Chen, Stanislav Markov, Jun Z. Huang, Ngai Wong, Weng Cho Chew and GuanHua Chen

A multi-scale modeling of junctionless field-effect transistors *Appl. Phys. Lett.* 2013, 103, 062109

54. Yu Zhang, **ChiYung Yam** and GuanHua Chen Dissipative time-dependent quantum transport theory *J. Chem. Phys.* 2013, 138, 164121

55. Hang Xie, Feng Jiang, Heng Tian, Xiao Zheng, Yanho Kwok, Shuguang Chen, **ChiYung Yam**, YiJing Yan and Guanhua Chen

Time-dependent quantum transport: an efficient method based on Liouville-von-Neumann equation for single-electron density matrix

J. Chem. Phys. 2012, 137, 044113

56. **ChiYung Yam**, Qing Zhang, Fan Wang and GuanHua Chen Linear-scaling quantum mechanical methods for excited states *Chem. Soc. Rev.* 2012, 41, 3821-3838

- 57. Lingyi Meng, **ChiYung Yam**, SiuKong Koo, Quan Chen, Ngai Wong and GuanHua Chen Dynamic multiscale quantum mechanics/electromagnetics simulation method *J. Chem. Theory Comput.* 2012, 8, 1190-1199
- 58. SiuKong Koo, **ChiYung Yam**, Xiao Zheng and GuanHua Chen First-principles Liouville–von Neumann equation for open systems and its applications *Phys. Status Solidi B* 2012, 249, 270-275
- 59. Yong Wang, **ChiYung Yam**, Thomas Frauenheim, GuanHua Chen and Thomas Niehaus An efficient method for quantum transport simulations in the time domain *Chem. Phys.* 2011, 391, 69-77

60. Fan Wang, **ChiYung Yam**, Lihong Hu and GuanHua Chen Time-dependent density functional theory based Ehrenfest dynamics *J. Chem. Phys.* 2011, 135, 044126

61. **ChiYung Yam**, Xiao Zheng, GuanHua Chen, Yong Wang, Thomas Frauenheim and Thomas Niehaus

Time-dependent versus static quantum transport simulations beyond linear response *Phys. Rev. B* 2011, 83, 245448

62. Yan Wang, ChiYung Yam, Ya Kun Chen and GuanHua Chen

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J. Chem. Phys. 2011, 134, 241103

63. Shizheng Wan, SiuKong Koo, **ChiYung Yam**, Xiao Zheng, Yijing Yan, Zhongming Su, Kangnian Fan, Li Cao, Wenping Wang and GuanHua Chen

Time-dependent current distributions of a two-terminal carbon nanotube-based electronic device *J. Phys. Chem. B* 2011, 115, 5519-5525

64. **ChiYung Yam**, Lingyi Meng, GuanHua Chen, Quan Chen and Ngai Wong Multiscale quantum mechanics/electromagnetics simulation for electronic devices *Phys. Chem. Phys.* 2011, 13, 14365-14369

65. Xiao Zheng, **ChiYung Yam**, Fan Wang and GuanHua Chen

Existence of time-dependent density-functional theory for open electronic systems: Time-dependent holographic electron density theorey

Phys. Chem. Chem. Phys. 2011, 13, 14358-14364

66. Xiao Zheng, GuanHua Chen, Yan Mo, SiuKong Koo, Heng Tian, **ChiYung Yam** and Yijin Yan Time-dependent density functional theory for quantum transport

J. Chem. Phys. 2010, 133, 114101

67. JianZhou Zheng, Xiao Zheng, **ChiYung Yam** and GuanHua Chen Computer simulation of Feynman's ratchet and pawl system

Phys. Rev. E 2010, 81, 061104

68. Binghai Yan, Chao-Xing Liu, Hai-Jun Zhang, **ChiYung Yam**, Xiao-Liang Qi, Thomas Frauenheim and Shou-Cheng Zhang

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Phys. Rev. Lett. 2009, 103, 189701

71. **ChiYung Yam**, Yan Mo, Fan Wang, Xiaobo Li, GuanHua Chen, Xiao Zheng, Yuki Matsuda, Jamil Tahir-Kheli and William A. Goddard III

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72. Fan Wang, **ChiYung Yam**, GuanHua Chen, XiuJun Wang, Kangnian Fan, Thomas A. Niehaus and Thomas Frauenheim

Linear-scaling time-dependent density-functional tight-binding method for absorption spectra of large systems

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#### 73. Fan Wang, ChiYung Yam and GuanHua Chen

Time-dependent density-functional theory/localized density matrix method for dynamic hyperpolarizability

J. Chem. Phys. 2007, 126, 244102

#### 74. Xiao Zheng, Fan Wang, **ChiYung Yam**, Yan Mo and GuanHua Chen

Time-dependent density-functional theory for open systems

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#### 75. Fan Wang, ChiYung Yam and GuanHua Chen

Density matrix based time-dependent density-functional theory and the solution of its linear response in real time domain

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# 76. JianZhou Zheng, Xiao Zheng, Yang Zhao, Yang Xie, **ChiYung Yam**, GuanHua Chen, Qing Jiang and Allen T. Chwang

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Phys. Rev. E 2007, 75, 041109

#### 77. ChiYung Yam, Xiao Zheng and GuanHua Chen

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Handbook of Theoretical and Computational Nanotechnology, Vol. 2, page 685-740, edited by Michael Reith and Wolfram Schommers (American Scientific Publishers, California, 2006)

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# 79. ChiChiu Ma, Yang Zhao, **ChiYung Yam**, GuanHua Chen and Qing Jiang

A tribological study of double-walled and triple-walled carbon nanotube oscillators

Nanotechnology 2005, 16, 1253

80. ChiYung Yam, ChiChiu Ma, XiuJun Wang and GuanHua Chen

Electronic structure and charge distribution of potassium iodide intercalated single walled carbon nanotubes

Appl. Phys. Lett. 2004, 85, 4484-4486

81. **ChiYung Yam**, Satoshi Yokojima and GuanHua Chen

 $Localized\hbox{-} density\hbox{-} matrix\ implementation\ of\ time\hbox{-} dependent\ density\hbox{-} functional\ theory$ 

J. Chem. Phys. 2003, 119, 8794

82. ChiYung Yam, Satoshi Yokojima and GuanHua Chen

Linear-scaling time-dependent density-functional theory

Phys. Rev. B 2003, 68, 153105