

CURRICULUM VITAE



Name: Xiao Dong

Gender: Male

Birthday: 1986.12.10

Email: charlary@163.com / xiao.dong@nankai.edu.cn

Profile: <https://my.nankai.edu.cn/wlxy/dx/list.htm>

Web of Science: <https://www.webofscience.com/wos/author/record/D-3984-2017>

Google Scholar: <https://scholar.google.com/citations?user=vLTk6F0AAAAJ>

Key words: Phase transition; Condensed matter physics; Pressure-induced chemistry; New Stoichiometry; Structure prediction;

Professional Experience and Education:

- 2017-now Associate professor, Nankai University, China
- 2015-2017 Postdoc, Center for High Pressure Science & Technology Advanced Research, Beijing, China
- 2012-2014 Visit Scholar Funded by CSC (201206200030), Dept. Geosciences & Institute for Advanced Computational Sciences, Stony Brook University, U.S.A.
- 2010-2015 PhD in condensed matter physics, Nankai University, China
- 2006-2010 BE in physics, Nankai University, China

Publications:

66 papers published, including 1 in Nature, 1 in Nat. Chem., 3 in PRL, 1 in PNAS, and 2 listed in ESI top1% Highly Cited Papers.

Web of Science: Total citation = 2190. H factor = 22.

Google Scholar: Total citation = 2712. H factor = 24.

Referee for >10 journals (including Phys. Rev. Lett., Nat. Commun., Small etc.).

Funding:

- 2024-2026 National talent project in China
- 2023-2025 Cultivation Project of Major Research Plan, NSFC
- 2022-2025 General Project, NSFC
- 2019-2021 Youth Project, NSFC

Honors:

- 2023 National talent project in China
- 2022 Vebleo Fellow (Jr.)
- 2020 Tianjin Young Elite Scientists Sponsorship Program
- 2019 Young Excellent Talents of Tianjin Innovation Plan

Professional Services:

- 2022 Observer of International Physics Olympiad
- 2022 Jury of International Young Physicists' Tournament
- 2022 Academic Council, Chinese professional committee in high pressure chemistry
- 2021 Academic Council, Tianjin youth association in science and technology

Lectures:

Major Courses:

Mathematical Methods in Physics	independent
Modern Physics Experiments	independent
The amazing world of physics	joint
IYPT-New ideas for physics	joint
Solid State Physics Lecture	joint

Invited Lectures: 26 seminars, invited talks and oral talks at conferences

Professional Training:

Postdocs: Bing Liu (2022), Baozhong Li (2024)

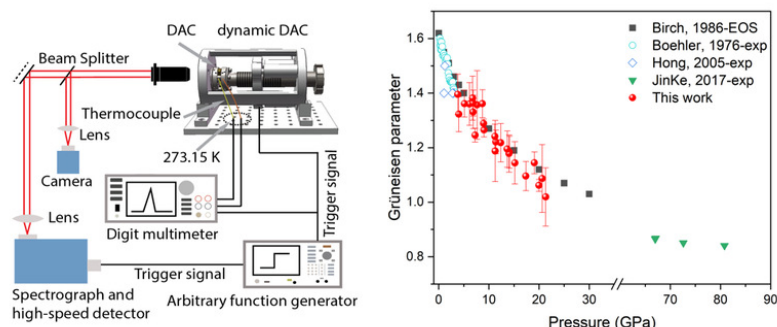
Students in group: Shengchao Qiu (2023), Yuanqing Liu (2023), Yuqing Zheng (2022), Jiachang Zhang (2021), Zhaonan Wang (2021), Hairui Ding (2020), Chunxia Chi (2019), Jun Kong (2019)

Graduated PhD: Hai-Fei Li (2018-2022)

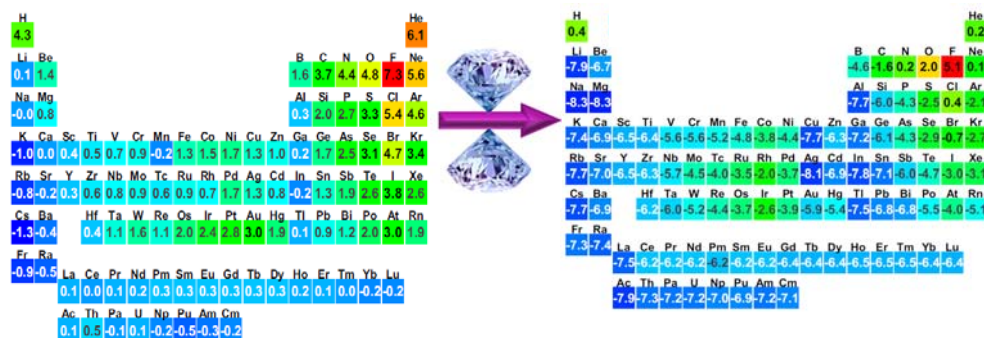
Graduated MS: Lei Zhang (2019-2022), Zifan Wang (2018-2021)

Selected Research Projects:

1. Phys. Rev. Lett. 131, 266101 (2023) Cooperating with HPSTAR, we developed the ultra-fast compression technology to achieve the pressure of GPAs in milliseconds. Then we are able to realize a quasi-adiabatic isentropic system in the diamond anvil cell and the in-situ measurement of thermodynamic parameters, such as Grüneisen parameters.



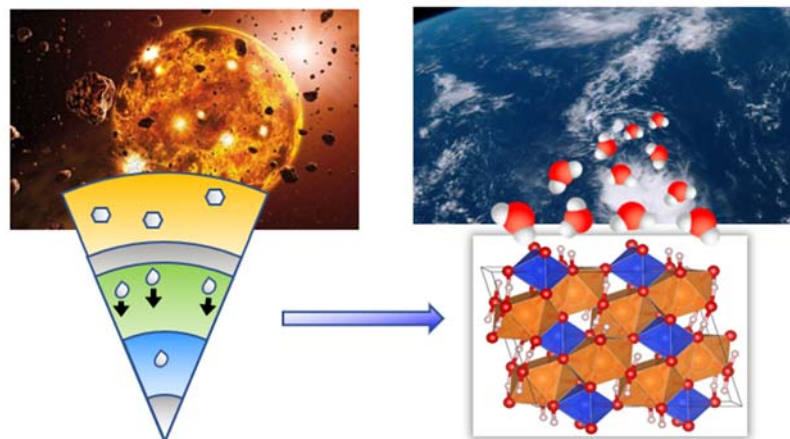
2. Proc. Natl. Acad. Sci. 119, 2117416119 (2022) Based on the first principle calculations, we systematically explored the pressure-induced periodic law with the key properties (electronegativity, chemical hardness, electronic configuration etc.) of H-Cm elements. In this way, we can create an evolution model of element properties under pressure to provide a physical picture and build theoretical foundation for the design of high-pressure compounds.



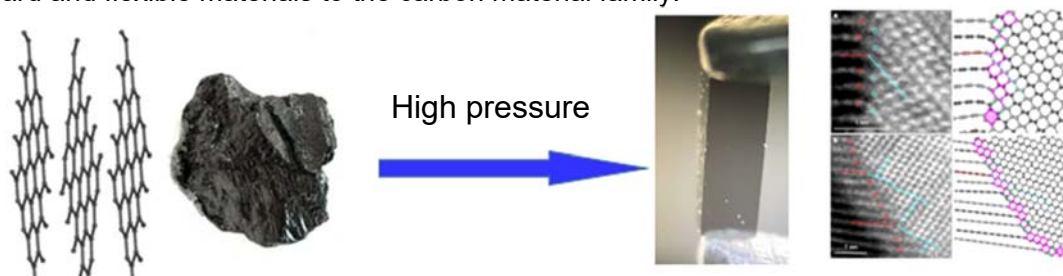
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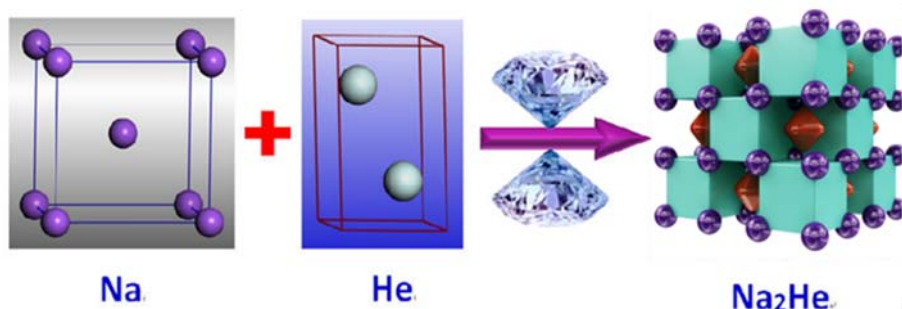
3. Phys. Rev. Lett. 128, 035703 (2022): We predicted a new type of magnesium silicate hydrate under high pressure. This planetary material can preserve huge amounts of water under high pressure during the core-mantle separation and reveal the possible mechanism of water preserve and release procedure inside the early Earth. This research provides new ideas for solving the important and ancient scientific problem for the origin of water on Earth.



4. Nature 607,489 (2022): Cooperating with experimental collaborators, we successfully synthesized a series of graphite-diamond hybrid structures using high pressure technique, proposing a new mechanism in solid-solid phase transition and adding a new group of hard and flexible materials to the carbon material family.



5. Nat. Chem. 9, 440 (2017) et al.: We predicted and synthesized the first helium high pressure solid compound Na_2He and found that the participation of He under high pressure plays a key role in synthesizing new materials, generating novel structures, and controlling electronic states. It changed people's traditional knowledge of "inert" gas elements and improved people's understanding of chemical bonding and giant planets.



List of publications

(+ means the first Authors contributed equally, * means the corresponding authors)

Chapter:

X. Dong, A. R. Oganov, "Electrides and Their High-Pressure Chemistry", Correlations in condensed matter under extreme conditions (edited by G. G. N. Angilella and A. La Magna, to be published by Springer to celebrate Renato Pucci's 70th birthday) (2017)

Representative papers:

1. H.-F. Li, A. R. Oganov... **X. Dong*** et al. "Ultra-high-Pressure Magnesium Hydrosilicates as Reservoirs of Water in Early Earth". *Phys. Rev. Lett.* **128**, 035703 (2022)

[Reported by APS Physics et al.](#)

2. **X. Dong***, A. R. Oganov* et al. "Electronegativity and chemical hardness of elements under pressure". *Proc. Natl. Acad. Sci.* **119**, 2117416119 (2022)

[Reported by EurekAlert!, Phys.org et al.](#)

3. K. Luo+, B. Liu+, W. Hu+, **X. Dong+**... Z. Zhao* et al. "Coherent interfaces govern direct transformation from graphite to diamond". *Nature* **607**, 486-491 (2022)

4. J. Kong+, K. Shi+, Xingbang Dong+, **Xiao Dong***... L. Su*, G. Yang*. "Expanding the Pressure Frontier in Grüneisen Parameter Measurement: Study of Sodium Chloride". *Phys. Rev. Lett.* **131**, 266101 (2023)

5. **X. Dong**, A. R. Oganov*... X.-F. Zhou*... H.-T. Wang*. "A Stable Compound of Helium and Sodium at High Pressure". *Nat. Chem.* **9**, 440-445 (2017)

[Reported by Nature, ScienceAlert, Phys.org, Chemistryworld, EurekAlert! et al.](#)
[ESI top1% Highly Cited Paper](#)

Other selected papers

I. First Author (including contributed equally)

6. **X. Dong**, J. Hou... H. Cui*... Y. L. Li*... X. F. Zhou* et al. "Predicted lithium oxide compounds and superconducting low-pressure LiO₄". *Phys. Rev. B* **100**, 144104 (2019)

7. **X. Dong**, L. Wang, K. Li*, H. Zheng* et al. "Tailored Synthesis of the Narrowest Zigzag Graphene Nanoribbon Structure by Compressing the Lithium Acetylide under High Temperature". *J. Phys. Chem. C* **122**, 20506-20512 (2018)

8. **X. Dong**, M. Hu... H.-T. Wang*. "A new phase from compression of carbon nanotubes with anisotropic Dirac fermions". *Sci. Rep.* **5**, 10713 (2015)

9. **X. Dong**, X.-F. Zhou... H.-T. Wang* et al. "An ab initio study on the transition paths from graphite to diamond under pressure". *J. Phys. Condens. Matter* **25**, 145402 (2013)

10. J. Sun+, **X. Dong+**... K. Li*, H. Zheng* et al, "Pressure-Induced Polymerization of Acetylene: Structure-Directed Stereoselectivity and a Possible Route to Graphane". *Angew. Chem.* **129**, 6553-6557 (2017)

11. L. Wang+, **X. Dong+**... H. Zheng*, K. Li*, C. Jin* et al. "Pressure-Induced Polymerization and Disproportionation of Li₂C₂ Accompanied with Irreversible Conductivity Enhancement". *J. Phys. Chem. Lett.* **8**, 4241-4245 (2017)

II. corresponding Authors

12. Z. Gao, **X. Dong***... J. Ren*. "Novel Two-Dimensional Silicon Dioxide with in-Plane

Negative Poisson's Ratio". *Nano Lett.* **17**, 772–777 (2017)

13. Y. Wang+, Y. Zhang+, B. Li+, K. Luo+... L. Su *, **X. Dong***, Z. Zhao*, G. Yang*. "Restacked melon as highly-efficient photocatalyst". *Nano Energy* **77**, 105124 (2020)
14. Z. Wang, H. Cui... **X. Dong***. "Can HHe⁺ exist at high pressure: Exploration of high pressure induced HF–He compounds". *Geosci. Front.* **12**, 1039-1043 (2021)
15. X.-L. He, S.-N. Pan... **X. Dong***, J. Sun*... X.-F. Zhou*. "Negative linear compressibility and unusual dynamic behavior of NaB₃". *Phys. Rev. Mater.* **5**, 035002 (2021)
16. J. Hou, X.-J. Weng... **X. Dong***... X.-F. Zhou*. "Helium-nitrogen mixtures at high pressure". *Phys. Rev. B* **103**, 060102 (2021)
17. X.-L. He+, X. Shao+... **X. Dong***... X.-F. Zhou* et al. "Predicting three-dimensional icosahedron-based boron B₆₀". *Phys. Rev. B* **99**, 184111. (2019)
18. M.-H. Zhu+, X.-J. Weng+... **X. Dong***... X.-F. Zhou*. "Magnetic borophenes from an evolutionary search". *Phys. Rev. B* **99**, 205412. (2019)
19. X. Yao, C. Xie*, **X. Dong***, A. R. Oganov*, et al. "Novel high-pressure calcium carbonates". *Phys. Rev. B* **98**, 014108. (2018)

III. other important papers:

20. P. Zhang, X. Tang... **X. Dong**, K. Li*, J. Ju* et al. "Distance-Selected Topochemical Dehydro-Diels-Alder Reaction of 1,4-Diphenylbutadiene toward Crystalline Graphitic Nanoribbons". *J. Am. Chem. Soc.* **142**, 17662 (2020)
21. X. Wang, P. Zhang... **X. Dong**... K. Li*, H. Zheng* et al. "Structure and Electrical Performance of Na₂C₆O₆ under High Pressure". *J. Phys. Chem. C* **123**, 17163. (2019)
22. Y. Wang, **X. Dong**... H. Zheng*, K. Li* et al. "Pressure-Induced Diels-Alder Reactions in C₆H₆-C₆F₆ Cocrystal towards Graphane Structure". *Angew. Chem. Int. Ed.* **58**, 1468 (2019)
23. M. Hu, **X. Dong**... Z. Zhao*... J. He* et al. "Low-energy 3D sp² carbons with versatile properties beyond graphite and graphene". *Dalton Trans.* **47**, 6233. (2018)
24. X.-L. He, **X. Dong**... X.-F. Zhou* et al. "Predicting the ground-state structure of sodium boride". *Phys. Rev. B* **97**, 100102. (2018)
25. S. Hong, Z. Zuo*, **X. Dong**... Y. Li*. "Efficiently suppressing lithium dendrites on atomic level by ultrafiltration membrane of graphdiyne". *Mater. Today Energy* **10**, 191 (2018).
26. S. S. Lobanov*, **X. Dong** et al. "Raman spectroscopy and x-ray diffraction of sp³ CaCO₃ at lower mantle pressures" *Phys. Rev. B* **96**, 104101 (2017)
27. H. Zheng+, L. Wang+, K. Li*... **X. Dong** et al. "Pressure induced polymerization of acetylide anions in CaC₂ and 10⁷ fold enhancement of electrical conductivity". *Chem. Sci.* **8**, 298 (2017)
28. H. Zheng, K. Li*... **X. Dong** et al. "Polymerization of Acetonitrile via a Hydrogen Transfer Reaction from CH₃ to CN under Extreme Conditions". *Angew. Chem. Int. Ed.* **55**, 12219 (2016)
29. S. Wang*, A. R. Oganov*... **X. Dong** et al. "Novel superhard B–C–O phases predicted from first principles". *Phys. Chem. Chem. Phys.* **18**, 1859–1863 (2016)
30. X.-F. Zhou*, **X. Dong** et al. "Semimetallic Two-Dimensional Boron Allotrope with Massless Dirac Fermions". *Phys. Rev. Lett.* **112**, 085502 (2014)
31. G.-R. Qian*, **X. Dong**... H.-T. Wang*. "Variable cell nudged elastic band method for studying solid-solid structural phase transitions". *Comput. Phys. Commun.* **184**, 2111

(2013)

32. Z. Zhao, F. Tian, **X. Dong**... Y. Ma*, Y. Tian*. "Tetragonal Allotrope of Group 14 Elements". *J. Am. Chem. Soc.* **134**, 12362 (2012)
33. F. Tian, **X. Dong**... H.-T. Wang*. "Superhard F-carbon predicted by ab initio particle-swarm optimization methodology". *J. Phys. Condens. Matter* **24**, 165504 (2012)
34. X.-F. Zhou, **X. Dong**... H.-T. Wang*. "High-pressure phases of NaAlH₄ from first principles". *Appl. Phys. Lett.* **100**, 061905 (2012)
35. X.-F. Zhou, A. R. Oganov, **X. Dong**... H.-T. Wang*. "Superconducting high-pressure phase of platinum hydride from first principles". *Phys. Rev. B* **84**, 054543 (2011)
36. X.-F. Zhou, G.-R. Qian, **X. Dong**... H.-T. Wang*. "Ab initio study of the formation of transparent carbon under pressure". *Phys. Rev. B* **82**, 134126 (2010)
37. X.-F. Zhou, **X. Dong**... H.-T. Wang*. "Unusual compression behavior of TiO₂ polymorphs from first principles". *Phys. Rev. B* **82**, 060102 (2010)