**Sóng Terahertz - Bức xạ bí ẩn của sự sống**

(Cập nhật đến ngày 11/11/2022)

Terahertz là dạng sóng mà cho đến nay hiểu biết về nó của các nhà vật lý vẫn rất hạn chế. Nằm giữa phổ vi sóng và hồng ngoại trong phổ điện từ, sóng Terahertz tương tác với cơ thể con người và các loại vật chất khác theo những cách chưa từng thấy trong lịch sử khoa học.

Mặc dù có nhiều tác dụng, những sóng này rất khó điều khiển. Trong nhiều thập kỷ, người ta đã không thể tạo ra một thiết bị sử dụng những sóng này. Tuy nhiên, được thúc đẩy bởi một loạt các tiềm năng ứng dụng của sóng Terahertz trong công nghiệp, xã hội và học thuật, nhiều nhà khoa học đang dần đạt được những tiến bộ trong lĩnh vực này.

Để hiểu rõ hơn Cục Thông tin KH&CN quốc gia xin giới thiệu một số bài nghiên cứu đã được xuất bản chính thức và các bài viết được chấp nhận đăng trên những cơ sở dữ liệu học thuật chính thống.



**1. Sciencedirect**

1. A silicon-based metasurface for terahertz sensing
Optics Communications 20 October 2021 Volume 506 (Cover date: 1 March 2022) Article 127572
Hui Hu, Zijian Cui, Yue Wang
<https://www.sciencedirect.com/science/article/pii/S003040182100821X/pdfft?md5=d3d3c041acd215969d7979b4f5f56fc2&pid=1-s2.0-S003040182100821X-main.pdf>

2. Quad-band polarization sensitive terahertz metamaterial absorber using Gemini-shaped structure
Results in Optics 22 June 2022 Volume 8 (Cover date: August 2022) Article 100254
Prince Jain, Krishna Prakash, Arun K. Singh
<https://www.sciencedirect.com/science/article/pii/S266695012200044X/pdfft?md5=c879f90f29d7f09ad386f92a965d6a52&pid=1-s2.0-S266695012200044X-main.pdf>

3. A quantitative analysis method based on collision broadening for trace gas using terahertz heterodyne spectrometer
Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 30 March 2022 Volume 276 (Cover date: 5 August 2022) Article 121208
Jia Li, Xiaojiao Deng, Yimin Ren
<https://www.sciencedirect.com/science/article/pii/S1386142522003572/pdfft?md5=a7e963c2e5258d2cb9f0948ed0dd3c26&pid=1-s2.0-S1386142522003572-main.pdf>

4. Excitation of intracenter terahertz radiation by plasma oscillations in electron–hole liquid
Materials Science and Engineering: B19 September 2022 Volume 286 (Cover date: December 2022) Article 115979
A. O. Zakhar’in, A. V. Andrianov, V. N Shastin
<https://www.sciencedirect.com/science/article/pii/S0921510722003671/pdfft?md5=9453af37db2d6fbac5f9725534dcd3bf&pid=1-s2.0-S0921510722003671-main.pdf>

5. Rapid measurements of hydrogen cyanide concentration in combustion gas via terahertz spectroscopy
Current Applied Physics 20 January 2022 Volume 36 (Cover date: April 2022) Pages 83-87
Mitsunori Araki, Ken Matsuyama
<https://www.sciencedirect.com/science/article/pii/S1567173922000013/pdfft?md5=378905fb547808428d0730db57f46c2b&pid=1-s2.0-S1567173922000013-main.pdf>

6. STO/PDMS composite film achieving continuously tunable terahertz phase modulation via mechanical and thermal regulation
Infrared Physics & Technology 27 June 2022 Volume 125 (Cover date: September 2022) Article 104280
Shuai Li, Xiangda Meng, Hao Tian
<https://www.sciencedirect.com/science/article/pii/S1350449522002614/pdfft?md5=344b6faf72fd8122251c195521fbca89&pid=1-s2.0-S1350449522002614-main.pdf>

7. Broadband terahertz characterization of graphene oxide films fabricated on flexible substrates
Optical Materials 13 February 2022 Volume 125 (Cover date: March 2022) Article 112045
Shreeya Rane, Avinash Kothuru, Dibakar Roy Chowdhury
<https://www.sciencedirect.com/science/article/pii/S0925346722000799/pdfft?md5=e41dba6eb96dfdbe85ee25ab8ba47209&pid=1-s2.0-S0925346722000799-main.pdf>

8. A terahertz wave all-optical modulator based on quartz-based MAPbI3 thin film
Optical Materials 29 March 2022 Volume 127 (Cover date: May 2022) Article 112235
Huaixing Wang, Furi Ling, Jianquan Yao
<https://www.sciencedirect.com/science/article/pii/S0925346722002695/pdfft?md5=8b5cc216b566c7a9cbbc0648a1d0a03a&pid=1-s2.0-S0925346722002695-main.pdf>

9. Electronic and optical properties of cubic quantum dots subjected to terahertz laser field
Photonics and Nanostructures - Fundamentals and Applications 2 February 2022 Volume 49 (Cover date: May 2022) Article 100994
Jiahao You, Kangxian Guo
<https://www.sciencedirect.com/science/article/pii/S1569441022000049/pdfft?md5=3fe121a7f0918f3527982896b242a989&pid=1-s2.0-S1569441022000049-main.pdf>

10. Active wavefronts control with graphene-functionalized terahertz Metasurfaces
Diamond and Related Materials 15 February 2022 Volume 124 (Cover date: April 2022) Article 108919
Dongjie Wang, Xunjun He, Guangjun Lv
<https://www.sciencedirect.com/science/article/pii/S0925963522001017/pdfft?md5=34f1cad4b606f389f4b544de9e621fde&pid=1-s2.0-S0925963522001017-main.pdf>

11. Active control of terahertz amplitude and phase based on graphene metasurface
Physica E: Low-dimensional Systems and Nanostructures 3 June 2022 Volume 143 (Cover date: September 2022) Article 115334
Yumin Gong, Baogang Quan, Weilin Xu
<https://www.sciencedirect.com/science/article/pii/S1386947722001758/pdfft?md5=7ba4f7f24b2a605d59e79b437d05f256&pid=1-s2.0-S1386947722001758-main.pdf>

12. Electrothermally controllable terahertz metamaterial for sensing application
Sensors and Actuators A: Physical 21 June 2022 Volume 344 (Cover date: 1 September 2022) Article 113667
Yuwei Liu, Daoye Zheng, Yu-Sheng Lin
<https://www.sciencedirect.com/science/article/pii/S0924424722003053/pdfft?md5=72ae42c0ab5e989180ddd7b705896f50&pid=1-s2.0-S0924424722003053-main.pdf>

13. Terahertz meta-absorber with tunable single- and dual-resonance characteristics
Physica E: Low-dimensional Systems and Nanostructures 16 May 2022 Volume 142 (Cover date: August 2022) Article 115274
Yuxin Liu, Xiaocan Xu, Yu-Sheng Lin
<https://www.sciencedirect.com/science/article/pii/S1386947722001242/pdfft?md5=208ce6ed7df2ebfc8801367f7e0bd5a8&pid=1-s2.0-S1386947722001242-main.pdf>

14. Terahertz sensing with high sensitivity and substance identification capability using a novel High-quality resonance supported by a thin structured silicon film
Optics & Laser Technology 19 April 2022 Volume 152 (Cover date: August 2022) Article 108177
Min SunEsha Maqbool, Zhanghua Han
<https://www.sciencedirect.com/science/article/pii/S0030399222003346/pdfft?md5=7bbcd38e92c586a3835f71d278763cce&pid=1-s2.0-S0030399222003346-main.pdf>

15. Absorption enhancement in terahertz region by cross-shaped grating
Optical Materials 15 September 2022 Volume 133 (Cover date: November 2022) Article 112958
Xiaoqing Zhu, Bo Wang
<https://www.sciencedirect.com/science/article/pii/S0925346722009958/pdfft?md5=687758f215b568957ac52b695daae5e9&pid=1-s2.0-S0925346722009958-main.pdf>

16. Rapid identification of producing area of wheat using terahertz spectroscopy combined with chemometrics
Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 9 December 2021 Volume 269 (Cover date: 15 March 2022) Article 120694
Yin Shen, Bin Li, Lirong Liu
<https://www.sciencedirect.com/science/article/pii/S1386142521012713/pdfft?md5=240531853f59786c67863b6271ee0450&pid=1-s2.0-S1386142521012713-main.pdf>

17. Tamm plasmon polaritons induced active terahertz ultra-narrowband absorbing with MoS2
Optics & Laser Technology 12 August 2022 Volume 156 (Cover date: December 2022) Article 108581
Yujie Zhong, Yi Huang, Zhike Peng
<https://www.sciencedirect.com/science/article/pii/S0030399222007307/pdfft?md5=c6d6577bd26e55f343f981e732577f1e&pid=1-s2.0-S0030399222007307-main.pdf>

18. A novel aging characterization method for silicone rubber based on terahertz absorption spectroscopy
Polymer Testing 6 August 2022 Volume 115 (Cover date: November 2022) Article 107723
Li Cheng, Yunfan Liu, Yuan Yuan
<https://www.sciencedirect.com/science/article/pii/S0142941822002446/pdfft?md5=f5b933b2903d1779975be497658f6727&pid=1-s2.0-S0142941822002446-main.pdf>

19. Theoretical and simulation study of dynamically tunable sensor based on liquid crystal-modulated Fano resonator in terahertz band
Optics & Laser Technology 14 June 2022 Volume 155 (Cover date: November 2022) Article 108350
Xue-Shi Li, Naixing Feng, Xiaoming Xiong
<https://www.sciencedirect.com/science/article/pii/S0030399222005072/pdfft?md5=3fb40c734184343e2c767cb860289e38&pid=1-s2.0-S0030399222005072-main.pdf>

20. Plasmonic interactions at the Pb/SeO2 interfaces designed as terahertz/gigahertz optical receivers
Optik 21 June 2022 Volume 265 (Cover date: September 2022) Article 169529
A. F. Qasrawi
<https://www.sciencedirect.com/science/article/pii/S0030402622008385/pdfft?md5=2813383d06ca339414e5afcf28fad0ad&pid=1-s2.0-S0030402622008385-main.pdf>

21. Design of a tunable monolayer MoS2/BP based terahertz absorber with six absorption bands
Optical Materials 3 January 2022 Volume 123 (Cover date: January 2022) Article 111958
Shuyun Zheng, Qiyu Huang
<https://www.sciencedirect.com/science/article/pii/S0925346721011587/pdfft?md5=2ca88b2bf15f6166537efce1b9e3e81d&pid=1-s2.0-S0925346721011587-main.pdf>

22. Autonomous dynamic line-scan continuous-wave terahertz non-destructive inspection system combined with unsupervised exposure fusion
NDT & E International 19 July 2022 Volume 132 (Cover date: December 2022) Article 102705
Jue Hu, Hai Zhang, Xavier Maldague
<https://www.sciencedirect.com/science/article/pii/S0963869522001049/pdfft?md5=4411c9579d1001b464011e944a3ae91c&pid=1-s2.0-S0963869522001049-main.pdf>

23. Detection of cancer biomarkers CA125 and CA199 via terahertz metasurface immunosensor
Talanta 30 May 2022 Volume 248 (Cover date: 1 October 2022) Article 123628
Shangjun Lin, Yuanli Wang, Fangrong Hu
<https://www.sciencedirect.com/science/article/pii/S0039914022004246/pdfft?md5=3d5bb3e8b23a7131e4bd515fb44b06f9&pid=1-s2.0-S0039914022004246-main.pdf>

24. Dual-mode terahertz broadband polarization conversion metasurface with integrated graphene-VO2
Optics Communications 5 January 2022 Volume 510 (Cover date: 1 May 2022) Article 127895
Yijia Zhao, Rongcao Yang, Wenmei Zhang
<https://www.sciencedirect.com/science/article/pii/S0030401821010191/pdfft?md5=ab8d4f6341e48ef69382305b1573053b&pid=1-s2.0-S0030401821010191-main.pdf>

25. The combination of terahertz spectroscopy and density functional theory for vibrational modes and weak interactions analysis of vanillin derivatives
Journal of Molecular Structure 29 May 2022 Volume 1265 (Cover date: 5 October 2022) Article 133404
Tao Chen, Zongqing Tang, Cong Hu
<https://www.sciencedirect.com/science/article/pii/S0022286022010602/pdfft?md5=8a140b93363b676cb0664161069c7a34&pid=1-s2.0-S0022286022010602-main.pdf>

26. Terahertz radiation in non-destructive testing of composite pyrotechnic materials
Composite Structures 7 October 2021 Volume 279 (Cover date: 1 January 2022) Article 114770
Pawel Hlosta, Marcin Nita, Waldemar Świderski
<https://www.sciencedirect.com/science/article/pii/S0263822321012198/pdfft?md5=93250da65f82b18691ffdd743219dbb2&pid=1-s2.0-S0263822321012198-main.pdf>

27. Differences in intermolecular interactions between 4-hydroxycoumarin and 7-hydroxycoumarin studied by terahertz spectroscopy and density functional theory
Chemical Physics 13 August 2022 Volume 562 (Cover date: 1 October 2022) Article 111676
Tao Chen, Lingxiao Yu, Fangrong Hu
<https://www.sciencedirect.com/science/article/pii/S0301010422002300/pdfft?md5=64e0e51cd79cb6b29f05edb60049ccd2&pid=1-s2.0-S0301010422002300-main.pdf>

28. Design and simulation of heptagonal porous core photonic crystal fiber for terahertz wave transmission
Optik 20 April 2022 Volume 260 (Cover date: June 2022) Article 169142
Nurul Awadah Nadiah Binti Suhaimi, Abdul Mu’iz Maidi, Feroza Begum
<https://www.sciencedirect.com/science/article/pii/S0030402622005010/pdfft?md5=c72d76de3ea8b301985abe2829577eda&pid=1-s2.0-S0030402622005010-main.pdf>

29. Terahertz imaging with metamaterials for biological applications
Sensors and Actuators B: Chemical 27 October 2021 Volume 352, Part 1 (Cover date: 1 February 2022) Article 130993
Yeeun Roh, Sang-Hun Lee, Minah Seo
<https://www.sciencedirect.com/science/article/pii/S0925400521015616/pdfft?md5=24d6de67fe0ed31d23dda3ff4e5d7687&pid=1-s2.0-S0925400521015616-main.pdf>

30. Lattice dynamics and terahertz response of microwave dielectrics: A case study of Al-doped Ca0.6Sm0.27TiO3 ceramics
Journal of the European Ceramic Society 20 May 2022 Volume 42, Issue 12 (Cover date: September 2022) Pages 4953-4961
Weijia Guo, Zhiyu Ma, Zhenxing Yue
<https://www.sciencedirect.com/science/article/pii/S0955221922003995/pdfft?md5=df8ce746b23903f68a7ebfaec28090d7&pid=1-s2.0-S0955221922003995-main.pdf>

31. Stability and optical tunability of flexible BST membrane observed in terahertz band
Ceramics International 27 March 2022 Volume 48, Issue 13 (Cover date: 1 July 2022) Pages 19006-19010
Xiaohua Xing, Ming Liu, Liang Wu
<https://www.sciencedirect.com/science/article/pii/S0272884222009798/pdfft?md5=561291618daf45cca27068a419a33d56&pid=1-s2.0-S0272884222009798-main.pdf>

32. Electrical activating of the “nonradiative” terahertz plasmon modes in a periodic grating-gate graphene structure with asymmetrical gating
Photonics and Nanostructures - Fundamentals and Applications 7 May 2022 Volume 50 (Cover date: July 2022) Article 101027
Mikhail Yu. Morozov, Vyacheslav V. Popov, Denis V. Fateev
<https://www.sciencedirect.com/science/article/pii/S1569441022000372/pdfft?md5=0d67a85f75100590a5d475ffa2190c5f&pid=1-s2.0-S1569441022000372-main.pdf>

33. Quantitative determination of acacia honey adulteration by terahertz-frequency dielectric properties as an alternative technique
Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 4 March 2022 Volume 274 (Cover date: 5 June 2022) Article 121106
Wen Liu, Xurong Yin, Wenjie Liu
<https://www.sciencedirect.com/science/article/pii/S1386142522002554/pdfft?md5=2e6cd55bd0f83aa074801be99b4727ec&pid=1-s2.0-S1386142522002554-main.pdf>

34. Visualising liquid transport through coated pharmaceutical tablets using Terahertz pulsed imaging
International Journal of Pharmaceutics 26 March 2022 Volume 619 (Cover date: 10 May 2022) Article 121703
Runqiao Dong, J. Axel Zeitler
<https://www.sciencedirect.com/science/article/pii/S0378517322002587/pdfft?md5=6fb1e69cd58ca0898000e51fb5178b16&pid=1-s2.0-S0378517322002587-main.pdf>

35. Voltage-induced terahertz magnon excitation associated with antiferromagnetic domain wall precession
Journal of Magnetism and Magnetic Materials 5 September 2022 Volume 563 (Cover date: 1 December 2022) Article 169858
Xu Ge, Yangyi Chen, Yue Zhang
<https://www.sciencedirect.com/science/article/pii/S0304885322007478/pdfft?md5=feb39b5b90929a5381543b5facf6d38f&pid=1-s2.0-S0304885322007478-main.pdf>

36. Ultra-wideband terahertz circulator with a ferrite-sphere filled triangle photonic crystal
Materials Science and Engineering: B12 January 2022 Volume 277 (Cover date: March 2022) Article 115603
Yong Wang, Dengguo Zhang, Hou Ian
<https://www.sciencedirect.com/science/article/pii/S0921510721005560/pdfft?md5=78214baeaaaf3bbb3ab7d8d31fc5bf90&pid=1-s2.0-S0921510721005560-main.pdf>

37. Switchable coding metasurface for flexible manipulation of terahertz wave based on Dirac semimetal
Results in Physics 4 January 2022 Volume 33 (Cover date: February 2022) Article 105204
Jingjing Huang, Xiaona Yin, Huiyun Zhang
<https://www.sciencedirect.com/science/article/pii/S2211379722000201/pdfft?md5=7d6ddf82921b98be3ae02be6f8e87ec5&pid=1-s2.0-S2211379722000201-main.pdf>

38. Dual-band tunable terahertz perfect absorber based on all-dielectric InSb resonator structure for sensing application
Journal of Alloys and Compounds 3 August 2022 Volume 925 (Cover date: 5 December 2022) Article 166617
Zhiren Li, Yongzhi Cheng, Xiangcheng Li
<https://www.sciencedirect.com/science/article/pii/S0925838822030080/pdfft?md5=b9e15990cabe4b58e794addc87e16beb&pid=1-s2.0-S0925838822030080-main.pdf>

39. A low loss platform for subwavelength terahertz graphene plasmon propagation
Optical Materials 5 May 2022 Volume 128 (Cover date: June 2022) Article 112436
Da Teng, Zhiwen Wang, Kai Wang
<https://www.sciencedirect.com/science/article/pii/S0925346722004700/pdfft?md5=461b3f4e40688c4c2400b6c2fb413d7a&pid=1-s2.0-S0925346722004700-main.pdf>

40. Terahertz linear polarizer made of an organic single crystal
Optics & Laser Technology 17 November 2021 Volume 147 (Cover date: March 2022) Article 107669
Takenori Tanno, Ryo Shimada, Toru Kurabayashi
<https://www.sciencedirect.com/science/article/pii/S003039922100757X/pdfft?md5=0ef064d450d970b4baff9f8da057525d&pid=1-s2.0-S003039922100757X-main.pdf>

41. Broadband and tunable terahertz absorption based on ethanol-treated carbon nanotube sponges
Results in Physics 6 September 2022 Volume 42 (Cover date: November 2022) Article 105971
Shi-Tong Xu, Fei Fan, Sheng-Jiang Chang
<https://www.sciencedirect.com/science/article/pii/S221137972200585X/pdfft?md5=774702be6617e770278f83e68191e480&pid=1-s2.0-S221137972200585X-main.pdf>

42. Highly efficient terahertz emission from layered ZrTe5 crystal with strong anisotropy and high in-plane carrier mobility
Journal of Luminescence 21 September 2021 Volume 241 (Cover date: January 2022) Article 118487
Yu Xia, Min Li, Heping Zeng
<https://www.sciencedirect.com/science/article/pii/S0022231321006037/pdfft?md5=0bbee1334b23c9ffa3cc75c242b97e9d&pid=1-s2.0-S0022231321006037-main.pdf>

43. Challenges and opportunities of terahertz technology in construction and demolition waste management
Journal of Environmental Management 25 April 2022 Volume 315 (Cover date: 1 August 2022) Article 115118
Andreja Abina, Uroš Puc, Aleksander Zidanšek
<https://www.sciencedirect.com/science/article/pii/S0301479722006910/pdfft?md5=fb8e6344c3e275866b94fb9fe95f8fa4&pid=1-s2.0-S0301479722006910-main.pdf>

44. Ultra-broadband terahertz absorber based on double truncated pyramid structure
Materials Today Communications 4 May 2022 Volume 31 (Cover date: June 2022) Article 103624
Guang Feng, Zhihui Chen, Yibiao Yang
<https://www.sciencedirect.com/science/article/pii/S2352492822004883/pdfft?md5=3273e6424ec6de04f5f9217494b03939&pid=1-s2.0-S2352492822004883-main.pdf>

45. The characterization of bovine compact bone fatigue damage using terahertz spectroscopy
Zeitschrift für Medizinische Physik Available online 25 June 2022 In press, corrected proof
Xianjia Meng, Qinghua Qin, Donghui Fu
<https://www.sciencedirect.com/science/article/pii/S0939388922000654/pdfft?md5=7b8b2709ee5955e35532769297ca053a&pid=1-s2.0-S0939388922000654-main.pdf>

46. Broadband terahertz multi-beam splitters with uniform power distribution based on coding metasurfaces
Optical Materials 18 March 2022 Volume 126 (Cover date: April 2022) Article 112228
Yan Teng, Chun Li, Ling Jiang
<https://www.sciencedirect.com/science/article/pii/S0925346722002622/pdfft?md5=8c5df9e8f54b11e6893eaffa42d6ea8c&pid=1-s2.0-S0925346722002622-main.pdf>

47. Terahertz antenna based on graphene material for breast tumor detection
Sensing and Bio-Sensing Research 8 August 2022 Volume 38 (Cover date: December 2022) Article 100511
Radhoine Aloui, Hassen Zairi, Sofien Mhatli
<https://www.sciencedirect.com/science/article/pii/S221418042200040X/pdfft?md5=c3d66118d7c8686797aa58934c54ea9c&pid=1-s2.0-S221418042200040X-main.pdf>

48. Fabrication and characterization of Se/WO3 heterojunctions designed as terahertz/gigahertz dielectric resonators
Optik 10 February 2022 Volume 255 (Cover date: April 2022) Article 168719
A. F. Qasrawi, Rana B. Daragme
<https://www.sciencedirect.com/science/article/pii/S0030402622001279/pdfft?md5=24303929541f1461ee672b50dfe52b19&pid=1-s2.0-S0030402622001279-main.pdf>

    Nguồn: Cục Thông tin khoa học và công nghệ quốc gia