

# ESI Highly Cited Papers in July 2024

---

- [Handheld high-throughput plasmonic biosensor using computational on-chip imaging](#)  
Arif E Cetin, Ahmet F Coskun, Betty C Galarreta, Min Huang, David Herman, Aydogan Ozcan & Hatice Altug  
*Light Sci Appl* **3**, e122 (2014). DOI: 10.1038/lisa.2014.3
- [Healthy, natural, efficient and tunable lighting: four-package white LEDs for optimizing the circadian effect, color quality and vision performance](#)  
Ji Hye Oh, Su Ji Yang & Young Rag Do  
*Light Sci Appl* **3**, e141 (2014). DOI: 10.1038/lisa.2014.22
- [Ultrafast lasers-reliable tools for advanced materials processing](#)  
Koji Sugioka & Ya Cheng  
*Light Sci Appl* **3**, e149 (2014). DOI: 10.1038/lisa.2014.30
- [Metallic nanostructures for light trapping in energy-harvesting devices](#)  
Chuan Fei Guo, Tianyi Sun, Feng Cao, Qian Liu & Zhifeng Ren  
*Light Sci Appl* **3**, e161 (2014). DOI: 10.1038/lisa.2014.42
- [Adaptive optical microscopy: the ongoing quest for a perfect image](#)  
Martin J Booth  
*Light Sci Appl* **3**, e165 (2014). DOI: 10.1038/lisa.2014.46
- [Generating optical orbital angular momentum at visible wavelengths using a plasmonic metasurface](#)  
Ebrahim Karimi, Sebastian A Schulz, Israel De Leon, Hammam Qassim, Jeremy Upham & Robert W Boyd  
*Light Sci Appl* **3**, e167 (2014). DOI: 10.1038/lisa.2014.48
- [Optical storage arrays: a perspective for future big data storage](#)  
Min Gu, Xiangping Li & Yaoyu Cao  
*Light Sci Appl* **3**, e177 (2014). DOI: 10.1038/lisa.2014.58
- [Light scattering and surface plasmons on small spherical particles](#)  
Xiaofeng Fan, Weitao Zheng & David J Singh  
*Light Sci Appl* **3**, e179 (2014). DOI: 10.1038/lisa.2014.60
- [Design and fabrication of broadband ultralow reflectivity black Si surfaces by laser micro/nanoprocessing](#)  
Jing Yang, Fangfang Luo, Tsung Sheng Kao, Xiong Li, Ghim Wei Ho, Jinghua Teng, Xiangang Luo & Minghui Hong  
*Light Sci Appl* **3**, e185 (2014). DOI: 10.1038/lisa.2014.66
- [Fundamentals of phase-only liquid crystal on silicon \(LCOS\) devices](#)  
Zichen Zhang, Zheng You & Daping Chu  
*Light Sci Appl* **3**, e213 (2014). DOI: 10.1038/lisa.2014.94

# ESI Highly Cited Papers in July 2024

---

11. [Coding metamaterials, digital metamaterials and programmable metamaterials](#)  
Tie Jun Cui, Mei Qing Qi, Xiang Wan, Jie Zhao & Qiang Cheng  
*Light Sci Appl* **3**, e218 (2014). DOI: 10.1038/lisa.2014.99
12. [Observation of efficient population of the red-emitting state from the green state by non-multiphonon relaxation in the Er<sup>3+</sup>-Yb<sup>3+</sup> system](#)  
Jiahua Zhang, Zhendong Hao, Jing Li, Xia Zhang, Yongshi Luo & Guohui Pan  
*Light Sci Appl* **4**, e239 (2015). DOI: 10.1038/lisa.2015.12
13. [Massive individual orbital angular momentum channels for multiplexing enabled by Dammann gratings](#)  
Ting Lei, Meng Zhang, Yuru Li, Ping Jia, Gordon Ning Liu, Xiaogeng Xu, Zhaohui Li, Changjun Min, Jiao Lin, Changyuan Yu, Hanben Niu & Xiaocong Yuan  
*Light Sci Appl* **4**, e257 (2015). DOI: 10.1038/lisa.2015.30
14. [Advances in InGaAs/InP single-photon detector systems for quantum communication](#)  
Jun Zhang, Mark A Itzler, Hugo Zbinden & Jian-Wei Pan  
*Light Sci Appl* **4**, e286 (2015). DOI: 10.1038/lisa.2015.59
15. [Giant photonic spin Hall effect in momentum space in a structured metamaterial with spatially varying birefringence](#)  
Xiaohui Ling, Xinxing Zhou, Xunong Yi, Weixing Shu, Yachao Liu, Shizhen Chen, Hailu Luo, Shuangchun Wen & Dianyuan Fan  
*Light Sci Appl* **4**, e290 (2015). DOI: 10.1038/lisa.2015.63
16. [Nanoplasmonic waveguides: towards applications in integrated nanophotonic circuits](#)  
Yurui Fang & Mengtao Sun  
*Light Sci Appl* **4**, e294 (2015). DOI: 10.1038/lisa.2015.67
17. [Optical tuning of exciton and trion emissions in monolayer phosphorene](#)  
Jiong Yang, Renjing Xu, Jiajie Pei, Ye Win Myint, Fan Wang, Zhu Wang, Shuang Zhang, Zongfu Yu & Yuerui Lu  
*Light Sci Appl* **4**, e312 (2015). DOI: 10.1038/lisa.2015.85
18. [Broadband diffusion of terahertz waves by multi-bit coding metasurfaces](#)  
Li-Hua Gao, Qiang Cheng, Jing Yang, Shao-Jie Ma, Jie Zhao, Shuo Liu, Hai-Bing Chen, Qiong He, Wei-Xiang Jiang, Hui-Feng Ma, Qi-Ye Wen, Lan-Ju Liang, Biao-Bing Jin, Wei-Wei Liu, Lei Zhou, Jian-Quan Yao, Pei-Heng Wu & Tie-Jun Cui  
*Light Sci Appl* **4**, e324 (2015). DOI: 10.1038/lisa.2015.97
19. [On-chip light sources for silicon photonics](#)  
Zhiping Zhou, Bing Yin & Jurgen Michel  
*Light Sci Appl* **4**, e358 (2015). DOI: 10.1038/lisa.2015.131
20. [Tailoring color emissions from N-doped graphene quantum dots for bioimaging applications](#)  
Dan Qu, Min Zheng, Jing Li, Zhigang Xie & Zaicheng Sun  
*Light Sci Appl* **4**, e364 (2015). DOI: 10.1038/lisa.2015.137

# ESI Highly Cited Papers in July 2024

21. [Photoexcitation dynamics in solution-processed formamidinium lead iodide perovskite thin films for solar cell applications](#)  
Hong-Hua Fang, Feng Wang, Sampson Adjokatse, Ni Zhao, Jacky Even & Maria Antonietta Loi  
*Light Sci Appl* **5**, e16056 (2016). DOI: 10.1038/lisa.2016.56
22. [High-efficiency surface plasmon meta-couplers: concept and microwave-regime realizations](#)  
Wujiong Sun, Qiong He, Shulin Sun & Lei Zhou  
*Light Sci Appl* **5**, e16003 (2016). DOI: 10.1038/lisa.2016.3
23. [Anisotropic coding metamaterials and their powerful manipulation of differently polarized terahertz waves](#)  
Shuo Liu, Tie Jun Cui, Quan Xu, Di Bao, Liangliang Du, Xiang Wan, Wen Xuan Tang, Chunmei Ouyang, Xiao Yang Zhou, Hao Yuan, Hui Feng Ma, Wei Xiang Jiang, Jiaguang Han, Weili Zhang & Qiang Cheng  
*Light Sci Appl* **5**, e16076 (2016). DOI: 10.1038/lisa.2016.76
24. [Energy transfer in plasmonic photocatalytic composites](#)  
Xiang-Chao Ma, Ying Dai, Lin Yu & Bai-Biao Huang  
*Light Sci Appl* **5**, e16017 (2016). DOI: 10.1038/lisa.2016.17
25. [A single Eu<sup>2+</sup>-activated high-color-rendering oxychloride white-light phosphor for white-light-emitting diodes](#)  
Peng-Peng Dai, Cong Li, Xin-Tong Zhang, Jun Xu, Xi Chen, Xiu-Li Wang, Yan Jia, Xiaojun Wang & Yi-Chun Liu  
*Light Sci Appl* **5**, e16024 (2016). DOI: 10.1038/lisa.2016.24
26. [Supra-\(carbon nanodots\) with a strong visible to near-infrared absorption band and efficient photothermal conversion](#)  
Di Li, Dong Han, Song-Nan Qu, Lei Liu, Peng-Tao Jing, Ding Zhou, Wen-Yu Ji, Xiao-Yun Wang, Tong-Fei Zhang & De-Zhen Shen  
*Light Sci Appl* **5**, e16120 (2016). DOI: 10.1038/lisa.2016.120
27. [New function of the Yb<sup>3+</sup> ion as an efficient emitter of persistent luminescence in the short-wave infrared](#)  
Yan-Jie Liang, Feng Liu, Ya-Fei Chen, Xiao-Jun Wang, Kang-Ning Sun & Zhengwei Pan  
*Light Sci Appl* **5**, e16124 (2016). DOI: 10.1038/lisa.2016.124
28. [Ultrafast laser processing of materials: from science to industry](#)  
Mangirdas Malinauskas, Albertas Žukauskas, Satoshi Hasegawa, Yoshio Hayasaki, Vygantas Mizeikis, Ričardas Buividas & Saulius Juodkazis  
*Light Sci Appl* **5**, e16133 (2016). DOI: 10.1038/lisa.2016.133
29. [Experimental quantum secure direct communication with single photons](#)  
Jian-Yong Hu, Bo Yu, Ming-Yong Jing, Lian-Tuan Xiao, Suo-Tang Jia, Guo-Qing Qin & Gui-Lu Long  
*Light Sci Appl* **5**, e16144 (2016). DOI: 10.1038/lisa.2016.144

# ESI Highly Cited Papers in July 2024

---

30. [Ca<sub>1-x</sub>Li<sub>x</sub>Al<sub>1-x</sub>Si<sub>1+x</sub>N<sub>3</sub>:Eu<sup>2+</sup> solid solutions as broadband, color-tunable and thermally robust red phosphors for superior color rendition white light-emitting diodes](#)  
Le Wang, Rong-Jun Xie, Yuanqiang Li, Xiaojun Wang, Chong-Geng Ma, Dong Luo, Takashi Takeda, Yi-Ting Tsai, Ru-Shi Liu & Naoto Hirosaki  
*Light Sci Appl* **5**, e16155 (2016). DOI: 10.1038/lisa.2016.155
31. [Information entropy of coding metasurface](#)  
Tie-Jun Cui, Shuo Liu & Lian-Lin Li  
*Light Sci Appl* **5**, e16172 (2016). DOI: 10.1038/lisa.2016.172
32. [Control over emissivity of zero-static-power thermal emitters based on phase-changing material GST](#)  
Kai-Kai Du, Qiang Li, Yan-Biao Lyu, Ji-Chao Ding, Yue Lu, Zhi-Yuan Cheng & Min Qiu  
*Light Sci Appl* **6**, e16194 (2017). DOI: 10.1038/lisa.2016.194
33. [Tomographic flow cytometry by digital holography](#)  
Francesco Merola, Pasquale Memmolo, Lisa Miccio, Roberto Savoia, Martina Mugnano, Angelo Fontana, Giuliana D'Ippolito, Angela Sardo, Achille Iolascon, Antonella Gambale & Pietro Ferraro  
*Light Sci Appl* **6**, e16241 (2017). DOI: 10.1038/lisa.2016.241
34. [Quantification of light-enhanced ionic transport in lead iodide perovskite thin films and its solar cell applications](#)  
Yi-Cheng Zhao, Wen-Ke Zhou, Xu Zhou, Kai-Hui Liu, Da-Peng Yu & Qing Zhao  
*Light Sci Appl* **6**, e16243 (2017). DOI: 10.1038/lisa.2016.243
35. [Parametric down-conversion photon-pair source on a nanophotonic chip](#)  
Xiang Guo, Chang-ling Zou, Carsten Schuck, Hojoong Jung, Risheng Cheng & Hong X Tang  
*Light Sci Appl* **6**, e16249 (2017). DOI: 10.1038/lisa.2016.249
36. [Generation of wavelength-independent subwavelength Bessel beams using metasurfaces](#)  
Wei Ting Chen, Mohammadreza Khorasaninejad, Alexander Y. Zhu, Jaewon Oh, Robert C. Devlin, Aun Zaidi & Federico Capasso  
*Light Sci Appl* **6**, e16259 (2017). DOI: 10.1038/lisa.2016.259
37. [Three-dimensional chiral microstructures fabricated by structured optical vortices in isotropic material](#)  
Jincheng Ni, Chaowei Wang, Chenchu Zhang, Yanlei Hu, Liang Yang, Zhaoxin Lao, Bing Xu, Jiawen Li, Dong Wu & Jiaru Chu  
*Light Sci Appl* **6**, e17011 (2017). DOI: 10.1038/lisa.2017.11
38. [Ultrasensitive broadband phototransistors based on perovskite/organic-semiconductor vertical heterojunctions](#)  
Chao Xie, Peng You, Zhike Liu, Li Li & Feng Yan  
*Light Sci Appl* **6**, e17023 (2017). DOI: 10.1038/lisa.2017.23

# ESI Highly Cited Papers in July 2024

---

39. [Multifunctional interleaved geometric-phase dielectric metasurfaces](#)  
Elhanan Maguid, Igor Yulevich, Michael Yannai, Vladimir Kleiner, Mark L Brongersma & Erez Hasman  
*Light Sci Appl* **6**, e17027 (2017). DOI: 10.1038/lisa.2017.27
40. [Optical manipulation from the microscale to the nanoscale: fundamentals, advances and prospects](#)  
Dongliang Gao, Weiqiang Ding, Manuel Nieto-Vesperinas, Xumin Ding, Mahdy Rahman, Tianhang Zhang, ChweeTeck Lim & Cheng-Wei Qiu  
*Light Sci Appl* **6**, e17039 (2017). DOI: 10.1038/lisa.2017.39
41. [Going beyond the limit of an LCD's color gamut](#)  
Hai-Wei Chen, Rui-Dong Zhu, Juan He, Wei Duan, Wei Hu, Yan-Qing Lu, Ming-Chun Li, Seok-Lyul Lee, Ya-Jie Dong & Shin-Tson Wu  
*Light Sci Appl* **6**, e17043 (2017). DOI: 10.1038/lisa.2017.43
42. [Beam switching and bifocal zoom lensing using active plasmonic metasurfaces](#)  
Xinghui Yin, Tobias Steinle, Lingling Huang, Thomas Taubner, Matthias Wuttig, Thomas Zentgraf & Harald Giessen  
*Light Sci Appl* **6**, e17016 (2017). DOI: 10.1038/lisa.2017.16
43. [Electrons dynamics control by shaping femtosecond laser pulses in micro/nanofabrication: modeling, method, measurement and application](#)  
Lan Jiang, An-Dong Wang, Bo Li, Tian-Hong Cui & Yong-Feng Lu  
*Light Sci Appl* **7**, 17134 (2018). DOI: 10.1038/lisa.2017.134
44. [Phase recovery and holographic image reconstruction using deep learning in neural networks](#)  
Yair Rivenson, Yibo Zhang, Harun Günaydın, Da Teng & Aydogan Ozcan  
*Light Sci Appl* **7**, 17141 (2018). DOI: 10.1038/lisa.2017.141
45. [Twisted photons: new quantum perspectives in high dimensions](#)  
Manuel Erhard, Robert Fickler, Mario Krenn & Anton Zeilinger  
*Light Sci Appl* **7**, 17146 (2018). DOI: 10.1038/lisa.2017.146
46. [Giant intrinsic chiro-optical activity in planar dielectric nanostructures](#)  
Alexander Y Zhu, Wei Ting Chen, Aun Zaidi, Yao-Wei Huang, Mohammadreza Khorasaninejad, Vyshakh Sanjeev, Cheng-Wei Qiu & Federico Capasso  
*Light Sci Appl* **7**, 17158 (2018). DOI: 10.1038/lisa.2017.158
47. [Liquid crystal display and organic light-emitting diode display: present status and future perspectives](#)  
Hai-Wei Chen, Jiun-Haw Lee, Bo-Yen Lin, Stanley Chen & Shin-Tson Wu  
*Light Sci Appl* **7**, 17168 (2018). DOI: 10.1038/lisa.2017.168

# ESI Highly Cited Papers in July 2024

---

48. [Boron nitride nanoresonators for phonon-enhanced molecular vibrational spectroscopy at the strong coupling limit](#)  
Marta Autore, Peining Li, Irene Dolado, Francisco J Alfaro-Mozaz, Ruben Esteban, Ainhoa Atxabal, Félix Casanova, Luis E Hueso, Pablo Alonso-González, Javier Aizpurua, Alexey Y Nikitin, Saül Vélez & Rainer Hillenbrand  
*Light Sci Appl* **7**, 17172 (2018). DOI: 10.1038/lisa.2017.172
49. [Quenching of the red Mn<sup>4+</sup> luminescence in Mn<sup>4+</sup>-doped fluoride LED phosphors](#)  
Tim Senden, Relinde J.A. van Dijk-Moes & Andries Meijerink  
*Light Sci Appl* **7**, 8 (2018). DOI: 10.1038/s41377-018-0013-1
50. [Reflective chiral meta-holography: multiplexing holograms for circularly polarized waves](#)  
Qiu Wang, Eric Plum, Quanlong Yang, Xueqian Zhang, Quan Xu, Yuehong Xu, Jianguang Han & Weili Zhang  
*Light Sci Appl* **7**, 25 (2018). DOI: 10.1038/s41377-018-0019-8
51. [Thermal camouflage based on the phase-changing material GST](#)  
Yurui Qu, Qiang Li, Lu Cai, Meiyan Pan, Pintu Ghosh, Kaikai Du & Min Qiu  
*Light Sci Appl* **7**, 26 (2018). DOI: 10.1038/s41377-018-0038-5
52. [All-optical active THz metasurfaces for ultrafast polarization switching and dynamic beam splitting](#)  
Longqing Cong, Yogesh Kumar Srivastava, Huifang Zhang, Xueqian Zhang, Jianguang Han & Ranjan Singh  
*Light Sci Appl* **7**, 28 (2018). DOI: 10.1038/s41377-018-0024-y
53. [Strategies for reducing speckle noise in digital holography](#)  
Vittorio Bianco, Pasquale Memmolo, Marco Leo, Silvio Montresor, Cosimo Distante, Melania Paturzo, Pascal Picart, Bahram Javidi & Pietro Ferraro  
*Light Sci Appl* **7**, 48 (2018). DOI: 10.1038/s41377-018-0050-9
54. [Looking at sound: optoacoustics with all-optical ultrasound detection](#)  
Georg Wissmeyer, Miguel A. Pleitez, Amir Rosenthal & Vasilis Ntziachristos  
*Light Sci Appl* **7**, 53 (2018). DOI: 10.1038/s41377-018-0036-7
55. [A hybrid invisibility cloak based on integration of transparent metasurfaces and zero-index materials](#)  
Hongchen Chu, Qi Li, Bingbing Liu, Jie Luo, Shulin Sun, Zhi Hong Hang, Lei Zhou & Yun Lai  
*Light Sci Appl* **7**, 50 (2018). DOI: 10.1038/s41377-018-0052-7
56. [Hybrid graphene metasurfaces for high-speed mid-infrared light modulation and single-pixel imaging](#)  
Beibei Zeng, Zhiqin Huang, Akhilesh Singh, Yu Yao, Abul K. Azad, Aditya D. Mohite, Antoinette J. Taylor, David R. Smith & Hou-Tong Chen  
*Light Sci Appl* **7**, 51 (2018). DOI: 10.1038/s41377-018-0055-4

# ESI Highly Cited Papers in July 2024

---

57. [Plasmonic nanostructure design and characterization via Deep Learning](#)  
Itzik Malkiel, Michael Mrejen, Achiya Nagler, Uri Arieli, Lior Wolf & Haim Suchowski  
*Light Sci Appl* **7**, 60 (2018). DOI: 10.1038/s41377-018-0060-7
58. [Multimode optical fiber transmission with a deep learning network](#)  
Babak Rahmani, Damien Loterie, Georgia Konstantinou, Demetri Psaltis & Christophe Moser  
*Light Sci Appl* **7**, 69 (2018). DOI: 10.1038/s41377-018-0074-1
59. [Broadband achromatic dielectric metalenses](#)  
Sajan Shrestha, Adam C. Overvig, Ming Lu, Aaron Stein & Nanfang Yu  
*Light Sci Appl* **7**, 85 (2018). DOI: 10.1038/s41377-018-0078-x
60. [X-ray-activated long persistent phosphors featuring strong UVC afterglow emissions](#)  
Yan-Min Yang, Zhi-Yong Li, Jun-Ying Zhang, Yue Lu, Shao-Qiang Guo, Qing Zhao, Xin Wang, Zi-Jun Yong, Hong Li, Ju-Ping Ma, Yoshihiro Kuroiwa, Chikako Moriyoshi, Li-Li Hu, Li-Yan Zhang, Li-Rong Zheng & Hong-Tao Sun  
*Light Sci Appl* **7**, 88 (2018). DOI: 10.1038/s41377-018-0089-7
61. [In vivo theranostics with near-infrared-emitting carbon dots-highly efficient photothermal therapy based on passive targeting after intravenous administration](#)  
Xin Bao, Ye Yuan, Jingqin Chen, Bohan Zhang, Di Li, Ding Zhou, Pengtao Jing, Guiying Xu, Yingli Wang, Kateřina Holá, Dezhen Shen, Changfeng Wu, Liang Song, Chengbo Liu, Radek Zbořil & Songnan Qu  
*Light Sci Appl* **7**, 91 (2018). DOI: 10.1038/s41377-018-0090-1
62. [Independent control of harmonic amplitudes and phases via a time-domain digital coding metasurface](#)  
Jun Yan Dai, Jie Zhao, Qiang Cheng & Tie Jun Cui  
*Light Sci Appl* **7**, 90 (2018). DOI: 10.1038/s41377-018-0092-z
63. [High-fidelity multimode fibre-based endoscopy for deep brain in vivo imaging](#)  
Sergey Turtaev, Ivo T. Leite, Tristan Altwegg-Boussac, Janelle M. P. Pakan, Nathalie L. Rochefort & Tomáš Čižmár  
*Light Sci Appl* **7**, 92 (2018). DOI: 10.1038/s41377-018-0094-x
64. [Multichannel vectorial holographic display and encryption](#)  
Ruizhe Zhao, Basudeb Sain, Qunshuo Wei, Chengchun Tang, Xiaowei Li, Thomas Weiss, Lingling Huang, Yongtian Wang & Thomas Zentgraf  
*Light Sci Appl* **7**, 95 (2018). DOI: 10.1038/s41377-018-0091-0
65. [Interference-assisted kaleidoscopic meta-plexer for arbitrary spin-wavefront manipulation](#)  
He-Xiu Xu, Guangwei Hu, Ying Li, Lei Han, Jianlin Zhao, Yunming Sun, Fang Yuan, Guang-Ming Wang, Zhi Hao Jiang, Xiaohui Ling, Tie Jun Cui & Cheng-Wei Qiu  
*Light Sci Appl* **8**, 3 (2019). DOI: 10.1038/s41377-018-0113-y

# ESI Highly Cited Papers in July 2024

---

66. [Direct observation of ultrafast plasmonic hot electron transfer in the strong coupling regime](#)  
Hangyong Shan, Ying Yu, Xingli Wang, Yang Luo, Shuai Zu, Bowen Du, Tianyang Han, Bowen Li, Yu Li, Jiarui Wu, Feng Lin, Kebin Shi, Beng Kang Tay, Zheng Liu, Xing Zhu & Zheyu Fang  
*Light Sci Appl* **8**, 9 (2019). DOI: 10.1038/s41377-019-0121-6
67. [Real-time high-resolution mid-infrared optical coherence tomography](#)  
Niels M. Israelsen, Christian R. Petersen, Ajanta Barh, Deepak Jain, Mikkel Jensen, Günther Hanneschläger, Peter Tidemand-Lichtenberg, Christian Pedersen, Adrian Podoleanu & Ole Bang  
*Light Sci Appl* **8**, 11 (2019). DOI: 10.1038/s41377-019-0122-5
68. [New strategy for designing orangish-red-emitting phosphor via oxygen-vacancy-induced electronic localization](#)  
Yi Wei, Gongcheng Xing, Kang Liu, Guogang Li, Peipei Dang, Sisi Liang, Min Liu, Ziyong Cheng, Dayong Jin & Jun Lin  
*Light Sci Appl* **8**, 15 (2019). DOI: 10.1038/s41377-019-0126-1
69. [PhaseStain: the digital staining of label-free quantitative phase microscopy images using deep learning](#)  
Yair Rivenson, Tairan Liu, Zhensong Wei, Yibo Zhang, Kevin de Haan & Aydogan Ozcan  
*Light Sci Appl* **8**, 23 (2019). DOI: 10.1038/s41377-019-0129-y
70. [Implementation and security analysis of practical quantum secure direct communication](#)  
Ruoyang Qi, Zhen Sun, Zaisheng Lin, Penghao Niu, Wentao Hao, Liyuan Song, Qin Huang, Jiancun Gao, Liuguo Yin & Gui-Lu Long  
*Light Sci Appl* **8**, 22 (2019). DOI: 10.1038/s41377-019-0132-3
71. [Optical orbital-angular-momentum-multiplexed data transmission under high scattering](#)  
Lei Gong, Qian Zhao, Hao Zhang, Xin-Yao Hu, Kun Huang, Jia-Miao Yang & Yin-Mei Li  
*Light Sci Appl* **8**, 27 (2019). DOI: 10.1038/s41377-019-0140-3
72. [Emerging ultra-narrow-band cyan-emitting phosphor for white LEDs with enhanced color rendition](#)  
Ming Zhao, Hongxu Liao, Maxim S. Molokeev, Yayun Zhou, Qinyuan Zhang, Quanlin Liu & Zhiguo Xia  
*Light Sci Appl* **8**, 38 (2019). DOI: 10.1038/s41377-019-0148-8
73. [Artificial neural networks enabled by nanophotonics](#)  
Qiming Zhang, Haoyi Yu, Martina Barbiero, Baokai Wang & Min Gu  
*Light Sci Appl* **8**, 42 (2019). DOI: 10.1038/s41377-019-0151-0
74. [3D Janus plasmonic helical nanoapertures for polarization-encrypted data storage](#)  
Yang Chen, Xiaodong Yang & Jie Gao  
*Light Sci Appl* **8**, 45 (2019). DOI: 10.1038/s41377-019-0156-8
75. [High-efficiency, large-area, topology-optimized metasurfaces](#)  
Thaibao Phan, David Sell, Evan W. Wang, Sage Doshay, Kofi Edee, Jianji Yang & Jonathan A. Fan  
*Light Sci Appl* **8**, 48 (2019). DOI: 10.1038/s41377-019-0159-5

# ESI Highly Cited Papers in July 2024

---

76. [Soliton bursts and deterministic dissipative Kerr soliton generation in auxiliary-assisted microcavities](#)  
Heng Zhou, Yong Geng, Wenwen Cui, Shu-Wei Huang, Qiang Zhou, Kun Qiu & Chee Wei Wong  
*Light Sci Appl* **8**, 50 (2019). DOI: 10.1038/s41377-019-0161-y
77. [A broadband achromatic metalens array for integral imaging in the visible](#)  
Zhi-Bin Fan, Hao-Yang Qiu, Han-Le Zhang, Xiao-Ning Pang, Li-Dan Zhou, Lin Liu, Hui Ren, Qiong-Hua Wang & Jian-Wen Dong  
*Light Sci Appl* **8**, 67 (2019). DOI: 10.1038/s41377-019-0178-2
78. [Nature-inspired chiral metasurfaces for circular polarization detection and full-Stokes polarimetric measurements](#)  
Ali Basiri, Xiahui Chen, Jing Bai, Pouya Amrollahi, Joe Carpenter, Zachary Holman, Chao Wang & Yu Yao  
*Light Sci Appl* **8**, 78 (2019). DOI: 10.1038/s41377-019-0184-4
79. [Multifunctional metaoptics based on bilayer metasurfaces](#)  
You Zhou, Ivan I. Kravchenko, Hao Wang, Hanyu Zheng, Gong Gu & Jason Valentine  
*Light Sci Appl* **8**, 80 (2019). DOI: 10.1038/s41377-019-0193-3
80. [Deep learning in holography and coherent imaging](#)  
Yair Rivenson, Yichen Wu & Aydogan Ozcan  
*Light Sci Appl* **8**, 85 (2019). DOI: 10.1038/s41377-019-0196-0
81. [Single-photon avalanche diode imagers in biophotonics: review and outlook](#)  
Claudio Bruschini, Harald Homulle, Ivan Michel Antolovic, Samuel Burri & Edoardo Charbon  
*Light Sci Appl* **8**, 87 (2019). DOI: 10.1038/s41377-019-0191-5
82. [3D-Integrated metasurfaces for full-colour holography](#)  
Yueqiang Hu, Xuhao Luo, Yiqin Chen, Qing Liu, Xin Li, Yasi Wang, Na Liu & Huigao Duan  
*Light Sci Appl* **8**, 86 (2019). DOI: 10.1038/s41377-019-0198-y
83. [Optical vortices 30 years on: OAM manipulation from topological charge to multiple singularities](#)  
Yijie Shen, Xuejiao Wang, Zhenwei Xie, Changjun Min, Xing Fu, Qiang Liu, Mali Gong & Xiacong Yuan  
*Light Sci Appl* **8**, 90 (2019). DOI: 10.1038/s41377-019-0194-2
84. [Dielectric metasurfaces for complete and independent control of the optical amplitude and phase](#)  
Adam C. Overvig, Sajan Shrestha, Stephanie C. Malek, Ming Lu, Aaron Stein, Changxi Zheng & Nanfang Yu  
*Light Sci Appl* **8**, 92 (2019). DOI: 10.1038/s41377-019-0201-7
85. [High-speed colour-converting photodetector with all-inorganic CsPbBr<sub>3</sub> perovskite nanocrystals for ultraviolet light communication](#)  
Chun Hong Kang, Ibrahim Dursun, Guangyu Liu, Lutfan Sinatra, Xiaobin Sun, Meiwei Kong, Jun Pan, Partha Maity, Ee-Ning Ooi, Tien Khee Ng, Omar F. Mohammed, Osman M. Bakr & Boon S. Ooi  
*Light Sci Appl* **8**, 94 (2019). DOI: 10.1038/s41377-019-0204-4

# ESI Highly Cited Papers in July 2024

86. [Intelligent metasurface imager and recognizer](#)  
Lianlin Li, Ya Shuang, Qian Ma, Haoyang Li, Hanting Zhao, Menglin Wei, Che Liu, Chenglong Hao, Cheng-Wei Qiu & Tie Jun Cui  
*Light Sci Appl* **8**, 97 (2019). DOI: 10.1038/s41377-019-0209-z
87. [Full-colour nanoprint-hologram synchronous metasurface with arbitrary hue-saturation-brightness control](#)  
Yanjun Bao, Ying Yu, Haofei Xu, Chao Guo, Juntao Li, Shang Sun, Zhang-Kai Zhou, Cheng-Wei Qiu & Xue-Hua Wang  
*Light Sci Appl* **8**, 95 (2019). DOI: 10.1038/s41377-019-0206-2
88. [Smart metasurface with self-adaptively reprogrammable functions](#)  
Qian Ma, Guo Dong Bai, Hong Bo Jing, Cheng Yang, Lianlin Li & Tie Jun Cui  
*Light Sci Appl* **8**, 98 (2019). DOI: 10.1038/s41377-019-0205-3
89. [Germanium/perovskite heterostructure for high-performance and broadband photodetector from visible to infrared telecommunication band](#)  
Wei Hu, Hui Cong, Wei Huang, Yu Huang, Lijuan Chen, Anlian Pan & Chunlai Xue  
*Light Sci Appl* **8**, 106 (2019). DOI: 10.1038/s41377-019-0218-y
90. [Adaptive optics in laser processing](#)  
Patrick S. Salter & Martin J. Booth  
*Light Sci Appl* **8**, 110 (2019). DOI: 10.1038/s41377-019-0215-1
91. [Design of task-specific optical systems using broadband diffractive neural networks](#)  
Yi Luo, Deniz Mengu, Nezh T. Yardimci, Yair Rivenson, Muhammed Veli, Mona Jarrahi & Aydogan Ozcan  
*Light Sci Appl* **8**, 12 (2019). DOI: 10.1038/s41377-019-0223-1
92. [Nonreciprocal metasurface with space-time phase modulation](#)  
Xuexue Guo, Yimin Ding, Yao Duan & Xingjie Ni  
*Light Sci Appl* **8**, 123 (2019). DOI: 10.1038/s41377-019-0225-z
93. [Raman lasing and soliton mode-locking in lithium niobate microresonators](#)  
Mengjie Yu, Yoshitomo Okawachi, Rebecca Cheng, Cheng Wang, Mian Zhang, Alexander L. Gaeta & Marko Lončar  
*Light Sci Appl* **9**, 9 (2020). DOI: 10.1038/s41377-020-0246-7
94. [Ultralow-loss geometric phase and polarization shaping by ultrafast laser writing in silica glass](#)  
Masaaki Sakakura, Yuhao Lei, Lei Wang, Yan-Hao Yu & Peter G. Kazansky  
*Light Sci Appl* **9**, 15 (2020). DOI: 10.1038/s41377-020-0250-y
95. [High-security-level multi-dimensional optical storage medium: nanostructured glass embedded with LiGa<sub>5</sub>O<sub>8</sub>: Mn<sup>2+</sup> with photostimulated luminescence](#)  
Shisheng Lin, Hang Lin, Chonggeng Ma, Yao Cheng, Sizhe Ye, Fulin Lin, Renfu Li, Ju Xu & Yuansheng Wang  
*Light Sci Appl* **9**, 22 (2020). DOI: 10.1038/s41377-020-0258-3

# ESI Highly Cited Papers in July 2024

96. [High-performance silicon–graphene hybrid plasmonic waveguide photodetectors beyond 1.55  \$\mu\text{m}\$](#)   
Jingshu Guo, Jiang Li, Chaoyue Liu, Yanlong Yin, Wenhui Wang, Zhenhua Ni, Zhilei Fu, Hui Yu, Yang Xu, Yaocheng Shi, Yungui Ma, Shiming Gao, Limin Tong & Daoxin Dai  
*Light Sci Appl* **9**, 29 (2020). DOI: 10.1038/s41377-020-0263-6
97. [Ultrafast and broadband photodetectors based on a perovskite/organic bulk heterojunction for large-dynamic-range imaging](#)  
Chenglong Li, Hailu Wang, Fang Wang, Tengfei Li, Mengjian Xu, Hao Wang, Zhen Wang, Xiaowei Zhan, Weida Hu & Liang Shen  
*Light Sci Appl* **9**, 31 (2020). DOI: 10.1038/s41377-020-0264-5
98. [O-FIB: far-field-induced near-field breakdown for direct nanowriting in an atmospheric environment](#)  
Zhen-Ze Li, Lei Wang, Hua Fan, Yan-Hao Yu, Qi-Dai Chen, Saulius Juodkazis & Hong-Bo Sun  
*Light Sci Appl* **9**, 41 (2020). DOI: 10.1038/s41377-020-0275-2
99. [Water-induced MAPbBr<sub>3</sub>@PbBr\(OH\) with enhanced luminescence and stability](#)  
Kai-Kai Liu, Qian Liu, Dong-Wen Yang, Ya-Chuan Liang, Lai-Zhi Sui, Jian-Yong Wei, Guo-Wei Xue, Wen-Bo Zhao, Xue-Ying Wu, Lin Dong & Chong-Xin Shan  
*Light Sci Appl* **9**, 44 (2020). DOI: 10.1038/s41377-020-0283-2
100. [Low-loss metasurface optics down to the deep ultraviolet region](#)  
Cheng Zhang, Shawn Divitt, Qingbin Fan, Wenqi Zhu, Amit Agrawal, Yanqing Lu, Ting Xu & Henri J. Lezec  
*Light Sci Appl* **9**, 55 (2020). DOI: 10.1038/s41377-020-0287-y
101. [Performing optical logic operations by a diffractive neural network](#)  
Chao Qian, Xiao Lin, Xiaobin Lin, Jian Xu, Yang Sun, Erping Li, Baile Zhang & Hongsheng Chen  
*Light Sci Appl* **9**, 59 (2020). DOI: 10.1038/s41377-020-0303-2
102. [High-temperature infrared camouflage with efficient thermal management](#)  
Huanzheng Zhu, Qiang Li, Chunqi Zheng, Yu Hong, Ziquan Xu, Han Wang, Weidong Shen, Sandeep Kaur, Pintu Ghosh & Min Qiu  
*Light Sci Appl* **9**, 60 (2020). DOI: 10.1038/s41377-020-0300-5
103. [High-speed femtosecond laser plasmonic lithography and reduction of graphene oxide for anisotropic photoresponse](#)  
Tingting Zou, Bo Zhao, Wei Xin, Ye Wang, Bin Wang, Xin Zheng, Hongbo Xie, Zhiyu Zhang, Jianjun Yang & Chunlei Guo  
*Light Sci Appl* **9**, 69 (2020). DOI: 10.1038/s41377-020-0311-2
104. [Phase imaging with an untrained neural network](#)  
Fei Wang, Yaoming Bian, Haichao Wang, Meng Lyu, Giancarlo Pedrini, Wolfgang Osten, George Barbastathis & Guohai Situ  
*Light Sci Appl* **9**, 77 (2020). DOI: 10.1038/s41377-020-0302-3

# ESI Highly Cited Papers in July 2024

---

105. [Controlling angular dispersions in optical metasurfaces](#)

Xiyue Zhang, Qi Li, Feifei Liu, Meng Qiu, Shulin Sun, Qiong He & Lei Zhou  
*Light Sci Appl* **9**, 76 (2020). DOI: 10.1038/s41377-020-0313-0

106. [Micro-light-emitting diodes with quantum dots in display technology](#)

Zhaojun Liu, Chun-Ho Lin, Byung-Ryool Hyun, Chin-Wei Sher, Zhijian Lv, Bingqing Luo, Fulong Jiang, Tom Wu, Chih-Hsiang Ho, Hao-Chung Kuo & Jr-Hau He  
*Light Sci Appl* **9**, 83 (2020). DOI: 10.1038/s41377-020-0268-1

107. [Strategies to approach high performance in Cr<sup>3+</sup>-doped phosphors for high-power NIR-LED light sources](#)

Zhenwei Jia, Chenxu Yuan, Yongfu Liu, Xiao-Jun Wang, Peng Sun, Lei Wang, Haochuan Jiang & Jun Jiang  
*Light Sci Appl* **9**, 86 (2020). DOI: 10.1038/s41377-020-0326-8

108. [Ten years of spasers and plasmonic nanolasers](#)

Shaimaa I. Azzam, Alexander V. Kildishev, Ren-Min Ma, Cun-Zheng Ning, Rupert Oulton, Vladimir M. Shalaev, Mark I. Stockman, Jia-Lu Xu & Xiang Zhang  
*Light Sci Appl* **9**, 90 (2020). DOI: 10.1038/s41377-020-0319-7

109. [Malus-metasurface-assisted polarization multiplexing](#)

Liangui Deng, Juan Deng, Zhiqiang Guan, Jin Tao, Yang Chen, Yan Yang, Daxiao Zhang, Jibo Tang, Zhongyang Li, Zile Li, Shaohua Yu, Guoxing Zheng, Hongxing Xu, Cheng-Wei Qiu & Shuang Zhang  
*Light Sci Appl* **9**, 101 (2020). DOI: 10.1038/s41377-020-0327-7

110. [Mini-LED, Micro-LED and OLED displays: present status and future perspectives](#)

Yuge Huang, En-Lin Hsiang, Ming-Yang Deng & Shin-Tson Wu  
*Light Sci Appl* **9**, 105 (2020). DOI: 10.1038/s41377-020-0341-9

111. [Simple experimental procedures to distinguish photothermal from hot-carrier processes in plasmonics](#)

Guillaume Baffou, Ivan Bordacchini, Andrea Baldi & Romain Quidant  
*Light Sci Appl* **9**, 108 (2020). DOI: 10.1038/s41377-020-00345-0

112. [Low-threshold topological nanolasers based on the second-order corner state](#)

Weixuan Zhang, Xin Xie, Huiming Hao, Jianchen Dang, Shan Xiao, Shushu Shi, Haiqiao Ni, Zhichuan Niu, Can Wang, Kuijuan Jin, Xiangdong Zhang & Xiulai Xu  
*Light Sci Appl* **9**, 109 (2020). DOI: 10.1038/s41377-020-00352-1

113. [Low-dose real-time X-ray imaging with nontoxic double perovskite scintillators](#)

Wenjuan Zhu, Wenbo Ma, Yirong Su, Zeng Chen, Xinya Chen, Yaoguang Ma, Lizhong Bai, Wenge Xiao, Tianyu Liu, Haiming Zhu, Xiaofeng Liu, Huafeng Liu, Xu Liu & Yang (Michael) Yang  
*Light Sci Appl* **9**, 112 (2020). DOI: 10.1038/s41377-020-00353-0

## ESI Highly Cited Papers in July 2024

---

114. [Monitoring the charge-transfer process in a Nd-doped semiconductor based on photoluminescence and SERS technology](#)  
Shuo Yang, Jiacheng Yao, Yingnan Quan, Mingyue Hu, Rui Su, Ming Gao, Donglai Han & Jinghai Yang  
*Light Sci Appl* **9**, 117 (2020). DOI: 10.1038/s41377-020-00361-0
115. [Transparent inorganic multicolour displays enabled by zinc-based electrochromic devices](#)  
Wu Zhang, Haizeng Li, William W. Yu & Abdulhakem Y. Elezzabi  
*Light Sci Appl* **9**, 121 (2020). DOI: 10.1038/s41377-020-00366-9
116. [Recent advances in 2D, 3D and higher-order topological photonics](#)  
Minkyung Kim, Zubin Jacob & Junsuk Rho  
*Light Sci Appl* **9**, 130 (2020). DOI: 10.1038/s41377-020-0331-y
117. [Electromagnetic chirality: from fundamentals to nontraditional chiroptical phenomena](#)  
Jungho Mun, Minkyung Kim, Younghwan Yang, Trevon Badloe, Jincheng Ni, Yang Chen, Cheng-Wei Qiu & Junsuk Rho  
*Light Sci Appl* **9**, 139 (2020). DOI: 10.1038/s41377-020-00367-8
118. [Black phosphorus-based photothermal therapy with aCD47-mediated immune checkpoint blockade for enhanced cancer immunotherapy](#)  
Zhongjian Xie, Minhua Peng, Ruitao Lu, Xiangying Meng, Weiyuan Liang, Zhongjun Li, Meng Qiu, Bin Zhang, Guohui Nie, Ni Xie, Han Zhang & Paras N. Prasad  
*Light Sci Appl* **9**, 161 (2020). DOI: 10.1038/s41377-020-00388-3
119. [Strain engineering of 2D semiconductors and graphene: from strain fields to band-structure tuning and photonic applications](#)  
Zhiwei Peng, Xiaolin Chen, Yulong Fan, David J. Srolovitz & Dangyuan Lei  
*Light Sci Appl* **9**, 190 (2020). DOI: 10.1038/s41377-020-00421-5
120. [Arbitrary polarization conversion dichroism metasurfaces for all-in-one full Poincaré sphere polarizers](#)  
Shuai Wang, Zi-Lan Deng, Yujie Wang, Qingbin Zhou, Xiaolei Wang, Yaoyu Cao, Bai-Ou Guan, Shumin Xiao & Xiangping Li  
*Light Sci Appl* **10**, 24 (2021). DOI: 10.1038/s41377-021-00468-y
121. [Thermally stable and highly efficient red-emitting Eu<sup>3+</sup>-doped Cs<sub>3</sub>GdGe<sub>3</sub>O<sub>9</sub> phosphors for WLEDs: non-concentration quenching and negative thermal expansion](#)  
Peipei Dang, Guogang Li, Xiaohan Yun, Qianqian Zhang, Dongjie Liu, Hongzhou Lian, Mengmeng Shang & Jun Lin  
*Light Sci Appl* **10**, 29 (2021). DOI: 10.1038/s41377-021-00469-x
122. [Optical whispering-gallery mode barcodes for high-precision and wide-range temperature measurements](#)  
Jie Liao & Lan Yang  
*Light Sci Appl* **10**, 32 (2021). DOI: 10.1038/s41377-021-00472-2

# ESI Highly Cited Papers in July 2024

---

123. [Review of biosensing with whispering-gallery mode lasers](#)  
Nikita Toropov, Gema Cabello, Mariana P. Serrano, Rithvik R. Gutha, Matías Rafti & Frank Vollmer  
*Light Sci Appl* **10**, 42 (2021). DOI: 10.1038/s41377-021-00471-3
124. [Glass crystallization making red phosphor for high-power warm white lighting](#)  
Tao Hu, Lixin Ning, Yan Gao, Jianwei Qiao, Enhai Song, Zitao Chen, Yayun Zhou, Jing Wang, Maxim S. Molokeev, Xiaoxing Ke, Zhiguo Xia & Qinyuan Zhang  
*Light Sci Appl* **10**, 56 (2021). DOI: 10.1038/s41377-021-00498-6
125. [Plasmonic tweezers: for nanoscale optical trapping and beyond](#)  
Yuquan Zhang, Changjun Min, Xiujie Dou, Xianyou Wang, Hendrik Paul Urbach, Michael G. Somekh & Xiaocong Yuan  
*Light Sci Appl* **10**, 59 (2021). DOI: 10.1038/s41377-021-00474-0
126. [High-performance quasi-2D perovskite light-emitting diodes: from materials to devices](#)  
Li Zhang, Changjiu Sun, Tingwei He, Yuanzhi Jiang, Junli Wei, Yanmin Huang & Mingjian Yuan  
*Light Sci Appl* **10**, 61 (2021). DOI: 10.1038/s41377-021-00501-0
127. [Spin-decoupled metasurface for simultaneous detection of spin and orbital angular momenta via momentum transformation](#)  
Yinghui Guo, Shicong Zhang, Mingbo Pu, Qiong He, Jinjin Jin, Mingfeng Xu, Yaxin Zhang, Ping Gao & Xiangang Luo  
*Light Sci Appl* **10**, 63 (2021). DOI: 10.1038/s41377-021-00497-7
128. [Efficient generation of complex vectorial optical fields with metasurfaces](#)  
Dongyi Wang, Feifei Liu, Tong Liu, Shulin Sun, Qiong He & Lei Zhou  
*Light Sci Appl* **10**, 67 (2021). DOI: 10.1038/s41377-021-00504-x
129. [Interlayer exciton formation, relaxation, and transport in TMD van der Waals heterostructures](#)  
Ying Jiang, Shula Chen, Weihao Zheng, Biyuan Zheng & Anlian Pan  
*Light Sci Appl* **10**, 72 (2021). DOI: 10.1038/s41377-021-00500-1
130. [Polarization-insensitive 3D conformal-skin metasurface cloak](#)  
He-Xiu Xu, Guangwei Hu, Yanzhao Wang, Chaohui Wang, Mingzhao Wang, Shaojie Wang, Yongjun Huang, Patrice Genevet, Wei Huang & Cheng-Wei Qiu  
*Light Sci Appl* **10**, 75 (2021). DOI: 10.1038/s41377-021-00507-8
131. [Circularly polarized luminescence from organic micro-/nano-structures](#)  
Yongjing Deng, Mengzhu Wang, Yanling Zhuang, Shujuan Liu, Wei Huang & Qiang Zhao  
*Light Sci Appl* **10**, 76 (2021). DOI: 10.1038/s41377-021-00516-7
132. [Progress on AlGaIn-based solar-blind ultraviolet photodetectors and focal plane arrays](#)  
Qing Cai, Haifan You, Hui Guo, Jin Wang, Bin Liu, Zili Xie, Dunjun Chen, Hai Lu, Youdou Zheng & Rong Zhang  
*Light Sci Appl* **10**, 94 (2021). DOI: 10.1038/s41377-021-00527-4

## ESI Highly Cited Papers in July 2024

---

133. [Multifunctional metasurfaces enabled by simultaneous and independent control of phase and amplitude for orthogonal polarization states](#)  
Mingze Liu, Wenqi Zhu, Pengcheng Huo, Lei Feng, Maowen Song, Cheng Zhang, Lu Chen, Henri J. Lezec, Yanqing Lu, Amit Agrawal & Ting Xu  
*Light Sci Appl* **10**, 107 (2021). DOI: 10.1038/s41377-021-00552-3
134. [Silicon/2D-material photodetectors: from near-infrared to mid-infrared](#)  
Chaoyue Liu, Jingshu Guo, Laiwen Yu, Jiang Li, Ming Zhang, Huan Li, Yaocheng Shi & Daoxin Dai  
*Light Sci Appl* **10**, 123 (2021). DOI: 10.1038/s41377-021-00551-4
135. [X-ray-charged bright persistent luminescence in NaYF<sub>4</sub>:Ln<sup>3+</sup>@NaYF<sub>4</sub> nanoparticles for multidimensional optical information storage](#)  
Yixi Zhuang, Dunrong Chen, Wenjing Chen, Wenxing Zhang, Xin Su, Renren Deng, Zhongfu An, Hongmin Chen & Rong-Jun Xie  
*Light Sci Appl* **10**, 132 (2021). DOI: 10.1038/s41377-021-00575-w
136. [Ultra-broadband metamaterial absorbers from long to very long infrared regime](#)  
Yu Zhou, Zheng Qin, Zhongzhu Liang, Dejia Meng, Haiyang Xu, David R. Smith & Yichun Liu  
*Light Sci Appl* **10**, 138 (2021). DOI: 10.1038/s41377-021-00577-8
137. [Reversible 3D optical data storage and information encryption in photo-modulated transparent glass medium](#)  
Zhen Hu, Xiongjian Huang, Zhengwen Yang, Jianbei Qiu, Zhiguo Song, Junying Zhang & Guoping Dong  
*Light Sci Appl* **10**, 140 (2021). DOI: 10.1038/s41377-021-00581-y
138. [Precursor-dependent structural diversity in luminescent carbonized polymer dots \(CPDs\): the nomenclature](#)  
Qingsen Zeng, Tanglue Feng, Songyuan Tao, Shoujun Zhu & Bai Yang  
*Light Sci Appl* **10**, 142 (2021). DOI: 10.1038/s41377-021-00579-6
139. [Advances of surface-enhanced Raman and IR spectroscopies: from nano/microstructures to macro-optical design](#)  
Hai-Long Wang, En-Ming You, Rajapandiyan Panneerselvam, Song-Yuan Ding & Zhong-Qun Tian  
*Light Sci Appl* **10**, 161 (2021). DOI: 10.1038/s41377-021-00599-2
140. [Hybrid laser precision engineering of transparent hard materials: challenges, solutions and applications](#)  
Huagang Liu, Wenxiong Lin & Minghui Hong  
*Light Sci Appl* **10**, 162 (2021). DOI: 10.1038/s41377-021-00596-5
141. [Ultrasensitive detection of endocrine disruptors via superfine plasmonic spectral combs](#)  
Lanhua Liu, Xuejun Zhang, Qian Zhu, Kaiwei Li, Yun Lu, Xiaohong Zhou & Tuan Guo  
*Light Sci Appl* **10**, 181 (2021). DOI: 10.1038/s41377-021-00618-2

# ESI Highly Cited Papers in July 2024

142. [A 15-user quantum secure direct communication network](#)  
Zhantong Qi, Yuanhua Li, Yiwen Huang, Juan Feng, Yuanlin Zheng & Xianfeng Chen  
*Light Sci Appl* **10**, 183 (2021). DOI: 10.1038/s41377-021-00634-2
143. [Polarisation optics for biomedical and clinical applications: a review](#)  
Chao He, Honghui He, Jintao Chang, Binguo Chen, Hui Ma & Martin J. Booth  
*Light Sci Appl* **10**, 194 (2021). DOI: 10.1038/s41377-021-00639-x
144. [Perfecting and extending the near-infrared imaging window](#)  
Zhe Feng, Tao Tang, Tianxiang Wu, Xiaoming Yu, Yuhuang Zhang, Meng Wang, Junyan Zheng, Yanyun Ying, Siyi Chen, Jing Zhou, Xiaoxiao Fan, Dan Zhang, Shengliang Li, Mingxi Zhang & Jun Qian  
*Light Sci Appl* **10**, 197 (2021). DOI: 10.1038/s41377-021-00628-0
145. [Research progress of full electroluminescent white light-emitting diodes based on a single emissive layer](#)  
Hengyang Xiang, Run Wang, Jiawei Chen, Fushan Li & Haibo Zeng  
*Light Sci Appl* **10**, 206 (2021). DOI: 10.1038/s41377-021-00640-4
146. [Augmented reality and virtual reality displays: emerging technologies and future perspectives](#)  
Jianghao Xiong, En-Lin Hsiang, Ziqian He, Tao Zhan & Shin-Tson Wu  
*Light Sci Appl* **10**, 216 (2021). DOI: 10.1038/s41377-021-00658-8
147. [Optical meta-waveguides for integrated photonics and beyond](#)  
Yuan Meng, Yizhen Chen, Longhui Lu, Yimin Ding, Andrea Cusano, Jonathan A. Fan, Qiaomu Hu, Kaiyuan Wang, Zhenwei Xie, Zhoutian Liu, Yuanmu Yang, Qiang Liu, Mali Gong, Qirong Xiao, Shulin Sun, Minming Zhang, Xiaocong Yuan & Xingjie Ni  
*Light Sci Appl* **10**, 235 (2021). DOI: 10.1038/s41377-021-00655-x
148. [One ion to catch them all: Targeted high-precision Boltzmann thermometry over a wide temperature range with Gd<sup>3+</sup>](#)  
Dechao Yu, Huaiyong Li, Dawei Zhang, Qinyuan Zhang, Andries Meijerink & Markus Suta  
*Light Sci Appl* **10**, 236 (2021). DOI: 10.1038/s41377-021-00677-5
149. [Far-field super-resolution ghost imaging with a deep neural network constraint](#)  
Fei Wang, Chenglong Wang, Mingliang Chen, Wenlin Gong, Yu Zhang, Shensheng Han & Guohai Situ  
*Light Sci Appl* **11**, 1 (2022). DOI: 10.1038/s41377-021-00680-w
150. [Van der Waals two-color infrared photodetector](#)  
Peisong Wu, Lei Ye, Lei Tong, Peng Wang, Yang Wang, Hailu Wang, Haonan Ge, Zhen Wang, Yue Gu, Kun Zhang, Yiye Yu, Meng Peng, Fang Wang, Min Huang, Peng Zhou & Weida Hu  
*Light Sci Appl* **11**, 6 (2022). DOI: 10.1038/s41377-021-00694-4
151. [Photonic matrix multiplication lights up photonic accelerator and beyond](#)  
Hailong Zhou, Jianji Dong, Junwei Cheng, Wenchan Dong, Chaoran Huang, Yichen Shen, Qiming Zhang, Min Gu, Chao Qian, Hongsheng Chen, Zhichao Ruan & Xinliang Zhang  
*Light Sci Appl* **11**, 30 (2022). DOI: 10.1038/s41377-022-00717-8

# ESI Highly Cited Papers in July 2024

---

152. [Deep learning in optical metrology: a review](#)

Chao Zuo, Jiaming Qian, Shijie Feng, Wei Yin, Yixuan Li, Pengfei Fan, Jing Han, Kemao Qian & Qian Chen

*Light Sci Appl* **11**, 39 (2022). DOI: 10.1038/s41377-022-00714-x

153. [Mechanism of the trivalent lanthanides' persistent luminescence in wide bandgap materials](#)

Leipeng Li, Tianyi Li, Yue Hu, Chongyang Cai, Yunqian Li, Xuefeng Zhang, Baolai Liang, Yanmin Yang & Jianrong Qiu

*Light Sci Appl* **11**, 51 (2022). DOI: 10.1038/s41377-022-00736-5

154. [Compact ultrabroadband light-emitting diodes based on lanthanide-doped lead-free double perovskites](#)

Shilin Jin, Renfu Li, Hai Huang, Naizhong Jiang, Jidong Lin, Shaoxiong Wang, Yuanhui Zheng, Xueyuan Chen & Daqin Chen

*Light Sci Appl* **11**, 52 (2022). DOI: 10.1038/s41377-022-00739-2

155. [Confined-domain crosslink-enhanced emission effect in carbonized polymer dots](#)

Songyuan Tao, Changjiang Zhou, Chunyuan Kang, Shoujun Zhu, Tanglue Feng, Shi-Tong Zhang, Zeyang Ding, Chengyu Zheng, Chunlei Xia & Bai Yang

*Light Sci Appl* **11**, 56 (2022). DOI: 10.1038/s41377-022-00745-4

156. [Spectral imaging with deep learning](#)

Longqian Huang, Ruichen Luo, Xu Liu & Xiang Hao

*Light Sci Appl* **11**, 61 (2022). DOI: 10.1038/s41377-022-00743-6

157. [Ultracompact meta-imagers for arbitrary all-optical convolution](#)

Weiwei Fu, Dong Zhao, Ziqin Li, Songde Liu, Chao Tian & Kun Huang

*Light Sci Appl* **11**, 62 (2022). DOI: 10.1038/s41377-022-00752-5

158. [Suppressing thermal quenching via defect passivation for efficient quasi-2D perovskite light-emitting diodes](#)

Dezhong Zhang, Yunxing Fu, Hongmei Zhan, Chenyang Zhao, Xiang Gao, Chuanjiang Qin & Lixiang Wang

*Light Sci Appl* **11**, 69 (2022). DOI: 10.1038/s41377-022-00761-4

159. [Chiral carbon dots: synthesis, optical properties, and emerging applications](#)

Aaron Döring, Elena Ushakova & Andrey L. Rogach

*Light Sci Appl* **11**, 75 (2022). DOI: 10.1038/s41377-022-00764-1

160. [Enabling robust and hour-level organic long persistent luminescence from carbon dots by covalent fixation](#)

Kai Jiang, Yuci Wang, Cunjian Lin, Licheng Zheng, Jiaren Du, Yixi Zhuang, Rongjun Xie, Zhongjun Li & Hengwei Lin

*Light Sci Appl* **11**, 80 (2022). DOI: 10.1038/s41377-022-00767-y

# ESI Highly Cited Papers in July 2024

161. [Realization of quantum secure direct communication over 100 km fiber with time-bin and phase quantum states](#)  
Haoran Zhang, Zhen Sun, Ruoyang Qi, Liuguo Yin, Gui-Lu Long & Jianhua Lu  
*Light Sci Appl* **11**, 83 (2022). DOI: 10.1038/s41377-022-00769-w
162. [A novel approach for designing efficient broadband photodetectors expanding from deep ultraviolet to near infrared](#)  
Nan Ding, Yanjie Wu, Wen Xu, Jiekai Lyu, Yue Wang, Lu Zi, Long Shao, Rui Sun, Nan Wang, Sen Liu, Donglei Zhou, Xue Bai, Ji Zhou & Hongwei Song  
*Light Sci Appl* **11**, 91 (2022). DOI: 10.1038/s41377-022-00777-w
163. [High-performance polarization management devices based on thin-film lithium niobate](#)  
Zhongjin Lin, Yanmei Lin, Hao Li, Mengyue Xu, Mingbo He, Wei Ke, Heyun Tan, Ya Han, Zhaohui Li, Dawei Wang, X. Steve Yao, Songnian Fu, Siyuan Yu & Xinlun Cai  
*Light Sci Appl* **11**, 93 (2022). DOI: 10.1038/s41377-022-00779-8
164. [Chip-integrated van der Waals PN heterojunction photodetector with low dark current and high responsivity](#)  
Ruijuan Tian, Xuetao Gan, Chen Li, Xiaoqing Chen, Siqi Hu, Linpeng Gu, Dries Van Thourhout, Andres Castellanos-Gomez, Zhipei Sun & Jianlin Zhao  
*Light Sci Appl* **11**, 101 (2022). DOI: 10.1038/s41377-022-00784-x
165. [One step synthesis of efficient red emissive carbon dots and their bovine serum albumin composites with enhanced multi-photon fluorescence for in vivo bioimaging](#)  
Huiqi Zhang, Gang Wang, Zhiming Zhang, Josh Haipeng Lei, Tzu-Ming Liu, Guichuan Xing, Chu-Xia Deng, Zikang Tang & Songnan Qu  
*Light Sci Appl* **11**, 113 (2022). DOI: 10.1038/s41377-022-00798-5
166. [Highly efficient Fe<sup>3+</sup>-doped A<sub>2</sub>BB' O<sub>6</sub> \(A = Sr<sup>2+</sup>, Ca<sup>2+</sup>; B, B' = In<sup>3+</sup>, Sb<sup>5+</sup>, Sn<sup>4+</sup>\) broadband near-infrared-emitting phosphors for spectroscopic analysis](#)  
Dongjie Liu, Guogang Li, Peipei Dang, Qianqian Zhang, Yi Wei, Lei Qiu, Maxim S. Molochev, Hongzhou Lian, Mengmeng Shang & Jun Lin  
*Light Sci Appl* **11**, 112 (2022). DOI: 10.1038/s41377-022-00803-x
167. [A nanotheranostic agent based on Nd<sup>3+</sup>-doped YVO<sub>4</sub> with blood-brain-barrier permeability for NIR-II fluorescence imaging/magnetic resonance imaging and boosted sonodynamic therapy of orthotopic glioma](#)  
Zhijia Lv, Longhai Jin, Yue Cao, Hao Zhang, Dongzhi Xue, Na Yin, Tianqi Zhang, Yinghui Wang, Jianhua Liu, Xiaogang Liu & Hongjie Zhang  
*Light Sci Appl* **11**, 116 (2022). DOI: 10.1038/s41377-022-00794-9
168. [Liquid crystal-powered Mie resonators for electrically tunable photorealistic color gradients and dark blacks](#)  
Trevon Badloe, Joohoon Kim, Inki Kim, Won-Sik Kim, Wook Sung Kim, Young-Ki Kim & Junsuk Rho  
*Light Sci Appl* **11**, 118 (2022). DOI: 10.1038/s41377-022-00806-8

# ESI Highly Cited Papers in July 2024

---

169. [Color-preserving passive radiative cooling for an actively temperature-regulated enclosure](#)  
Yining Zhu, Hao Luo, Chenying Yang, Bing Qin, Pintu Ghosh, Sandeep Kaur, Weidong Shen, Min Qiu, Pavel Belov & Qiang Li  
*Light Sci Appl* **11**, 122 (2022). DOI: 10.1038/s41377-022-00810-y
170. [A metasurface-based light-to-microwave transmitter for hybrid wireless communications](#)  
Xin Ge Zhang, Ya Lun Sun, Bingcheng Zhu, Wei Xiang Jiang, Qian Yu, Han Wei Tian, Cheng-Wei Qiu, Zaichen Zhang & Tie Jun Cui  
*Light Sci Appl* **11**, 126 (2022). DOI: 10.1038/s41377-022-00817-5
171. [Deep learning acceleration of multiscale superresolution localization photoacoustic imaging](#)  
Jongbeom Kim, Gyuwon Kim, Lei Li, Pengfei Zhang, Jin Young Kim, Yeonggeun Kim, Hyung Ham Kim, Lihong V. Wang, Seungchul Lee & Chulhong Kim  
*Light Sci Appl* **11**, 131 (2022). DOI: 10.1038/s41377-022-00820-w
172. [Blue LED-pumped intense short-wave infrared luminescence based on Cr<sup>3+</sup>-Yb<sup>3+</sup>-co-doped phosphors](#)  
Yan Zhang, Shihai Miao, Yanjie Liang, Chao Liang, Dongxun Chen, Xihui Shan, Kangning Sun & Xiao-Jun Wang  
*Light Sci Appl* **11**, 136 (2022). DOI: 10.1038/s41377-022-00816-6
173. [Real-time whole-brain imaging of hemodynamics and oxygenation at micro-vessel resolution with ultrafast wide-field photoacoustic microscopy](#)  
Xiaoyi Zhu, Qiang Huang, Anthony DiSpirito, Tri Vu, Qiangzhou Rong, Xiaorui Peng, Huaxin Sheng, Xiling Shen, Qifa Zhou, Laiming Jiang, Ulrike Hoffmann & Junjie Yao  
*Light Sci Appl* **11**, 138 (2022). DOI: 10.1038/s41377-022-00836-2
174. [Lanthanide-doped heterostructured nanocomposites toward advanced optical anti-counterfeiting and information storage](#)  
Yao Xie, Yapai Song, Guotao Sun, Pengfei Hu, Artur Bednarkiewicz & Lining Sun  
*Light Sci Appl* **11**, 150 (2022). DOI: 10.1038/s41377-022-00813-9
175. [Metasurface-enabled on-chip multiplexed diffractive neural networks in the visible](#)  
Xuhao Luo, Yueqiang Hu, Xiangnian Ou, Xin Li, Jiajie Lai, Na Liu, Xinbin Cheng, Anlian Pan & Huigao Duan  
*Light Sci Appl* **11**, 158 (2022). DOI: 10.1038/s41377-022-00844-2
176. [Advanced liquid crystal devices for augmented reality and virtual reality displays: principles and applications](#)  
Kun Yin, En-Lin Hsiang, Junyu Zou, Yannanqi Li, Zhiyong Yang, Qian Yang, Po-Cheng Lai, Chih-Lung Lin & Shin-Tson Wu  
*Light Sci Appl* **11**, 161 (2022). DOI: 10.1038/s41377-022-00851-3

# ESI Highly Cited Papers in July 2024

177. [Highly efficient green InP-based quantum dot light-emitting diodes regulated by inner alloyed shell component](#)  
Peng Yu, Sheng Cao, Yuliang Shan, Yuhe Bi, Yaqi Hu, Ruosheng Zeng, Bingsuo Zou, Yunjun Wang & Jialong Zhao  
*Light Sci Appl* **11**, 162 (2022). DOI: 10.1038/s41377-022-00855-z
178. [Transport of intensity diffraction tomography with non-interferometric synthetic aperture for three-dimensional label-free microscopy](#)  
Jiaji Li, Ning Zhou, Jiasong Sun, Shun Zhou, Zhidong Bai, Linpeng Lu, Qian Chen & Chao Zuo  
*Light Sci Appl* **11**, 154 (2022). DOI: 10.1038/s41377-022-00815-7
179. [Electron-phonon coupling-assisted universal red luminescence of o-phenylenediamine-based carbon dots](#)  
Boyang Wang, Zhihong Wei, Laizhi Sui, Jingkun Yu, Baowei Zhang, Xiaoyong Wang, Shengnan Feng, Haoqiang Song, Xue Yong, Yuxi Tian, Bai Yang & Siyu Lu  
*Light Sci Appl* **11**, 172 (2022). DOI: 10.1038/s41377-022-00865-x
180. [Advances in cost-effective integrated spectrometers](#)  
Ang Li, Chunhui Yao, Junfei Xia, Huijie Wang, Qixiang Cheng, Richard Penty, Yeshaiahu Fainman & Shilong Pan  
*Light Sci Appl* **11**, 174 (2022). DOI: 10.1038/s41377-022-00853-1
181. [Design of coherent wideband radiation process in a Nd<sup>3+</sup>-doped high entropy glass system](#)  
Linde Zhang, Jingyuan Zhang, Xiang Wang, Meng Tao, Gangtao Dai, Jing Wu, Zhangwang Miao, Shifei Han, Haijuan Yu & Xuechun Lin  
*Light Sci Appl* **11**, 181 (2022). DOI: 10.1038/s41377-022-00848-y
182. [High-fidelity carbon dots polarity probes: revealing the heterogeneity of lipids in oncology](#)  
Jingyu Hu, Yuanqiang Sun, Xin Geng, Junli Wang, Yifei Guo, Lingbo Qu, Ke Zhang & Zhaohui Li  
*Light Sci Appl* **11**, 185 (2022). DOI: 10.1038/s41377-022-00873-x
183. [Tunable liquid crystal grating based holographic 3D display system with wide viewing angle and large size](#)  
Yi-Long Li, Nan-Nan Li, Di Wang, Fan Chu, Sin-Doo Lee, Yi-Wei Zheng & Qiong-Hua Wang  
*Light Sci Appl* **11**, 188 (2022). DOI: 10.1038/s41377-022-00880-y
184. [Dual-color terahertz spatial light modulator for single-pixel imaging](#)  
Weili Li, Xuemei Hu, Jingbo Wu, Kebin Fan, Benwen Chen, Caihong Zhang, Wei Hu, Xun Cao, Biaobing Jin, Yanqing Lu, Jian Chen & Peiheng Wu  
*Light Sci Appl* **11**, 191 (2022). DOI: 10.1038/s41377-022-00879-5
185. [Dielectric metalens for miniaturized imaging systems: progress and challenges](#)  
Meiyan Pan, Yifei Fu, Mengjie Zheng, Hao Chen, Yujia Zang, Huigao Duan, Qiang Li, Min Qiu & Yueqiang Hu  
*Light Sci Appl* **11**, 195 (2022). DOI: 10.1038/s41377-022-00885-7

# ESI Highly Cited Papers in July 2024

186. [Deep-ultraviolet nonlinear optical crystals: concept development and materials discovery](#)  
Lei Kang & Zheshuai Lin  
*Light Sci Appl* **11**, 201 (2022). DOI: 10.1038/s41377-022-00899-1
187. [1-Pbps orbital angular momentum fibre-optic transmission](#)  
Junyi Liu, Jingxing Zhang, Jie Liu, Zhenrui Lin, Zhenhua Li, Zhongzheng Lin, Junwei Zhang, Cong Huang, Shuqi Mo, Lei Shen, Shuqing Lin, Yujie Chen, Ran Gao, Lei Zhang, Xiaobo Lan, Xinlun Cai, Zhaohui Li & Siyuan Yu  
*Light Sci Appl* **11**, 202 (2022). DOI: 10.1038/s41377-022-00889-3
188. [Towards higher-dimensional structured light](#)  
Chao He, Yijie Shen & Andrew Forbes  
*Light Sci Appl* **11**, 205 (2022). DOI: 10.1038/s41377-022-00897-3
189. [Nanocomposites based on lanthanide-doped upconversion nanoparticles: diverse designs and applications](#)  
Kaimin Du, Jing Feng, Xuan Gao & Hongjie Zhang  
*Light Sci Appl* **11**, 222 (2022). DOI: 10.1038/s41377-022-00871-z
190. [Liquid crystal-templated chiral nanomaterials: from chiral plasmonics to circularly polarized luminescence](#)  
Xuan Zhang, Yiyi Xu, Cristian Valenzuela, Xinfang Zhang, Ling Wang, Wei Feng & Quan Li  
*Light Sci Appl* **11**, 223 (2022). DOI: 10.1038/s41377-022-00913-6
191. [Review of computer-generated hologram algorithms for color dynamic holographic three-dimensional display](#)  
Dapu Pi, Juan Liu & Yongtian Wang  
*Light Sci Appl* **11**, 231 (2022). DOI: 10.1038/s41377-022-00916-3
192. [Multifunctional resonant wavefront-shaping meta-optics based on multilayer and multi-perturbation nonlocal metasurfaces](#)  
Stephanie C. Malek, Adam C. Overvig, Andrea Alù & Nanfang Yu  
*Light Sci Appl* **11**, 246 (2022). DOI: 10.1038/s41377-022-00905-6
193. [Fundamentals and comprehensive insights on pulsed laser synthesis of advanced materials for diverse photo-and electrocatalytic applications](#)  
Jayaraman Theerthagiri, K. Karuppasamy, Seung Jun Lee, R. Shwetharani, Hyun-Seok Kim, S. K. Khadheer Pasha, Muthupandian Ashokkumar & Myong Yong Choi  
*Light Sci Appl* **11**, 250 (2022). DOI: 10.1038/s41377-022-00904-7
194. [An excellent deep-ultraviolet birefringent material based on \[BO<sub>2</sub>\]<sup>∞</sup> infinite chains](#)  
Fangfang Zhang, Xinglong Chen, Min Zhang, Wenqi Jin, Shujuan Han, Zhihua Yang & Shilie Pan  
*Light Sci Appl* **11**, 252 (2022). DOI: 10.1038/s41377-022-00941-2

# ESI Highly Cited Papers in July 2024

195. [Formation and fluorescent mechanism of red emissive carbon dots from \*o\*-phenylenediamine and catechol system](#)  
Pengfei Li, Shanshan Xue, Lu Sun, Xupeng Zong, Li An, Dan Qu, Xiayan Wang & Zaicheng Sun  
*Light Sci Appl* **11**, 298 (2022). DOI: 10.1038/s41377-022-00984-5
196. [High-operating-temperature mid-infrared photodetectors via quantum dot gradient homojunction](#)  
Xiaomeng Xue, Menglu Chen, Yuning Luo, Tianling Qin, Xin Tang & Qun Hao  
*Light Sci Appl* **12**, 2 (2023). DOI: 10.1038/s41377-022-01014-0
197. [Dielectric Mie voids: confining light in air](#)  
Mario Hentschel, Kirill Koshelev, Florian Sterl, Steffen Both, Julian Karst, Lida Shamsafar, Thomas Weiss, Yuri Kivshar & Harald Giessen  
*Light Sci Appl* **12**, 3 (2023). DOI: 10.1038/s41377-022-01015-z
198. [Phase-controlled van der Waals growth of wafer-scale 2D MoTe<sub>2</sub> layers for integrated high-sensitivity broadband infrared photodetection](#)  
Di Wu, Chenguang Guo, Longhui Zeng, Xiaoyan Ren, Zhifeng Shi, Long Wen, Qin Chen, Meng Zhang, Xin Jian Li, Chong-Xin Shan & Jiansheng Jie  
*Light Sci Appl* **12**, 5 (2023). DOI: 10.1038/s41377-022-01047-5
199. [Advanced liquid crystal-based switchable optical devices for light protection applications: principles and strategies](#)  
Ruicong Zhang, Zhibo Zhang, Jiecai Han, Lei Yang, Jiajun Li, Zicheng Song, Tianyu Wang & Jiaqi Zhu  
*Light Sci Appl* **12**, 11 (2023). DOI: 10.1038/s41377-022-01032-y
200. [Active terahertz beam steering based on mechanical deformation of liquid crystal elastomer metasurface](#)  
Xiaolin Zhuang, Wei Zhang, Kemeng Wang, Yangfan Gu, Youwen An, Xueqian Zhang, Jianqiang Gu, Dan Luo, Jiaguang Han & Weili Zhang  
*Light Sci Appl* **12**, 14 (2023). DOI: 10.1038/s41377-022-01046-6
201. [Graphene/MoS<sub>2-x</sub>O<sub>x</sub>/graphene photomemristor with tunable non-volatile responsivities for neuromorphic vision processing](#)  
Xiao Fu, Tangxin Li, Bin Cai, Jinshui Miao, Gennady N. Panin, Xinyu Ma, Jinjin Wang, Xiaoyong Jiang, Qing Li, Yi Dong, Chunhui Hao, Juyi Sun, Hangyu Xu, Qixiao Zhao, Mengjia Xia, Bo Song, Fansheng Chen, Xiaoshuang Chen, Wei Lu & Weida Hu  
*Light Sci Appl* **12**, 39 (2023). DOI: 10.1038/s41377-023-01079-5
202. [Perovskite-based color camera inspired by human visual cells](#)  
Yujin Liu, Zhong Ji, Guobiao Cen, Hengchao Sun, Haibao Wang, Chuanxi Zhao, Zhong Lin Wang & Wenjie Mai  
*Light Sci Appl* **12**, 43 (2023). DOI: 10.1038/s41377-023-01072-y

# ESI Highly Cited Papers in July 2024

203. [Testing universality of Feynman-Tan relation in interacting Bose gases using high-order Bragg spectra](#)  
Yunfei Wang, Huiying Du, Yuqing Li, Feng Mei, Ying Hu, Liantuan Xiao, Jie Ma & Suotang Jia  
*Light Sci Appl* **12**, 50 (2023). DOI: 10.1038/s41377-023-01103-8
204. [Deep learning-enabled virtual histological staining of biological samples](#)  
Bijie Bai, Xilin Yang, Yuzhu Li, Yijie Zhang, Nir Pillar & Aydogan Ozcan  
*Light Sci Appl* **12**, 57 (2023). DOI: 10.1038/s41377-023-01104-7
205. [In-situ growth of low-dimensional perovskite-based insular nanocrystals for highly efficient light emitting diodes](#)  
Hao Wang, Weidong Xu, Qi Wei, Si Peng, Yuequn Shang, Xianyuan Jiang, Danni Yu, Kai Wang, Ruihua Pu, Chenxi Zhao, Zihao Zang, Hansheng Li, Yile Zhang, Ting Pan, Zijian Peng, Xiaoqin Shen, Shengjie Ling, Weimin Liu, Feng Gao & Zhijun Ning  
*Light Sci Appl* **12**, 62 (2023). DOI: 10.1038/s41377-023-01112-7
206. [Upconversion time-stretch infrared spectroscopy](#)  
Kazuki Hashimoto, Takuma Nakamura, Takahiro Kageyama, Venkata Ramaiah Badarla, Hiroyuki Shimada, Ryoich Horisaki & Takuro Ideguchi  
*Light Sci Appl* **12**, 48 (2023). DOI: 10.1038/s41377-023-01096-4
207. [Arbitrarily polarized bound states in the continuum with twisted photonic crystal slabs](#)  
Haoye Qin, Zengping Su, Mengqi Liu, Yixuan Zeng, Man-Chung Tang, Mengyao Li, Yuzhi Shi, Wei Huang, Cheng-Wei Qiu & Qinghua Song  
*Light Sci Appl* **12**, 66 (2023). DOI: 10.1038/s41377-023-01090-w
208. [One-step printable platform for high-efficiency metasurfaces down to the deep-ultraviolet region](#)  
Joohoon Kim, Wonjoong Kim, Dong Kyo Oh, Hyunjung Kang, Hongyoon Kim, Trevon Badloe, Seokwoo Kim, Chanwoong Park, Hojung Choi, Heon Lee & Junsuk Rho  
*Light Sci Appl* **12**, 68 (2023). DOI: 10.1038/s41377-023-01086-6
209. [Angular momentum holography via a minimalist metasurface for optical nested encryption](#)  
Hui Yang, Peng He, Kai Ou, Yueqiang Hu, Yuting Jiang, Xiangnian Ou, Honghui Jia, Zhenwei Xie, Xiaocong Yuan & Huigao Duan  
*Light Sci Appl* **12**, 79 (2023). DOI: 10.1038/s41377-023-01125-2
210. [Monolithic integration of embedded III-V lasers on SOI](#)  
Wen-Qi Wei, An He, Bo Yang, Zi-Hao Wang, Jing-Zhi Huang, Dong Han, Ming Ming, Xuhan Guo, Yikai Su, Jian-Jun Zhang & Ting Wang  
*Light Sci Appl* **12**, 84 (2023). DOI: 10.1038/s41377-023-01128-z
211. [Non-Hermitian chiral degeneracy of gated graphene metasurfaces](#)  
Soojeong Baek, Sang Hyun Park, Donghak Oh, Kanghee Lee, Sangha Lee, Hosub Lim, Taewoo Ha, Hyun Sung Park, Shuang Zhang, Lan Yang, Bumki Min & Teun-Teun Kim  
*Light Sci Appl* **12**, 87 (2023). DOI: 10.1038/s41377-023-01121-6

# ESI Highly Cited Papers in July 2024

212. [On-chip generation of Bessel-Gaussian beam via concentrically distributed grating arrays for long-range sensing](#)  
Zihao Zhi, Quanxin Na, Qijie Xie, Baisong Chen, Yingzhi Li, Xiaobin Liu, Xuotong Li, Lijun Wang, Guoqiang Lo & Junfeng Song  
*Light Sci Appl* **12**, 92 (2023). DOI: 10.1038/s41377-023-01133-2
213. [Compact multi-foci metalens spectrometer](#)  
Ruoxing Wang, Muhammad Afnan Ansari, Hammad Ahmed, Yan Li, Wenfeng Cai, Yanjun Liu, Songtao Li, Jianlong Liu, Li Li & Xianzhong Chen  
*Light Sci Appl* **12**, 103 (2023). DOI: 10.1038/s41377-023-01148-9
214. [Photonic structures in radiative cooling](#)  
Minjae Lee, Gwansik Kim, Yeongju Jung, Kyung Rok Pyun, Jinwoo Lee, Byung-Wook Kim & Seung Hwan Ko  
*Light Sci Appl* **12**, 134 (2023). DOI: 10.1038/s41377-023-01119-0
215. [Directional terahertz holography with thermally active Janus metasurface](#)  
Benwen Chen, Shengxin Yang, Jian Chen, Jingbo Wu, Ke Chen, Weili Li, Yihui Tan, Zhaosong Wang, Hongsong Qiu, Kebin Fan, Caihong Zhang, Huabing Wang, Yijun Feng, Yunbin He, Biaobing Jin, Xinglong Wu, Jian Chen & Peiheng Wu  
*Light Sci Appl* **12**, 136 (2023). DOI: 10.1038/s41377-023-01177-4
216. [Integrated metasurfaces for re-envisioning a near-future disruptive optical platform](#)  
Younghwan Yang, Junhwa Seong, Minseok Choi, Junkyeong Park, Gyeongtae Kim, Hongyoon Kim, Junhyeon Jeong, Chunghwan Jung, Joohoon Kim, Gyoseon Jeon, Kyung-il Lee, Dong Hyun Yoon & Junsuk Rho  
*Light Sci Appl* **12**, 152 (2023). DOI: 10.1038/s41377-023-01169-4
217. [Recent advances in metasurface design and quantum optics applications with machine learning, physics-informed neural networks, and topology optimization methods](#)  
Wenye Ji, Jin Chang, He-Xiu Xu, Jian Rong Gao, Simon Gröblacher, H. Paul Urbach & Aurèle J. L. Adam  
*Light Sci Appl* **12**, 169 (2023). DOI: 10.1038/s41377-023-01218-y
218. [Recent progress in quantum photonic chips for quantum communication and internet](#)  
Wei Luo, Lin Cao, Yuzhi Shi, Lingxiao Wan, Hui Zhang, Shuyi Li, Guanyu Chen, Yuan Li, Sijin Li, Yunxiang Wang, Shihai Sun, Muhammad Faeyz Karim, Hong Cai, Leong Chuan Kwek & Ai Qun Liu  
*Light Sci Appl* **12**, 175 (2023). DOI: 10.1038/s41377-023-01173-8
219. [Intervalence charge transfer of Cr<sup>3+</sup>-Cr<sup>3+</sup> aggregation for NIR-II luminescence](#)  
Shengqiang Liu, Jingxuan Du, Zhen Song, Chonggeng Ma & Quanlin Liu  
*Light Sci Appl* **12**, 181 (2023). DOI: 10.1038/s41377-023-01219-x

# ESI Highly Cited Papers in July 2024

---

220. [On the use of deep learning for phase recovery](#)

Kaiqiang Wang, Li Song, Chutian Wang, Zhenbo Ren, Guangyuan Zhao, Jiazhen Dou, Jianglei Di, George Barbastathis, Renjie Zhou, Jianlin Zhao & Edmund Y. Lam  
*Light Sci Appl* **13**, 4 (2024). DOI: 10.1038/s41377-023-01340-x

221. [Color liquid crystal grating based color holographic 3D display system with large viewing angle](#)

Di Wang, Yi-Long Li, Fan Chu, Nan-Nan Li, Zhao-Song Li, Sin-Doo Lee, Zhong-Quan Nie, Chao Liu & Qiong-Hua Wang  
*Light Sci Appl* **13**, 16 (2024). DOI: 10.1038/s41377-023-01375-0

222. [Near infrared emissions from both high efficient quantum cutting \(173%\) and nearly-pure-color upconversion in  \$\text{NaY}\(\text{WO}\_4\)\_2:\text{Er}^{3+}/\text{Yb}^{3+}\$  with thermal management capability for silicon-based solar cells](#)

Duan Gao, Baojiu Chen, Xuezhu Sha, Yuhang Zhang, Xin Chen, Li Wang, Xizhen Zhang, Jinsu Zhang, Yongze Cao, Yichao Wang, Lei Li, Xiangping Li, Sai Xu, Hongquan Yu & Lihong Cheng  
*Light Sci Appl* **13**, 17 (2024). DOI: 10.1038/s41377-023-01365-2

223. [Tunnelling of electrons via the neighboring atom](#)

Ming Zhu, Jihong Tong, Xiwang Liu, Weifeng Yang, Xiaochun Gong, Wenyu Jiang, Peifen Lu, Hui Li, Xiaohong Song & Jian Wu  
*Light Sci Appl* **13**, 18 (2024). DOI: 10.1038/s41377-023-01373-2

224. [Wearable and interactive multicolored photochromic fiber display](#)

Pan Li, Yuwei Wang, Xiaoxian He, Yuyang Cui, Jingyu Ouyang, Ju Ouyang, Zicheng He, Jiayu Hu, Xiaojuan Liu, Hang Wei, Yu Wang, Xiaoling Lu, Qian Ji, Xinyuan Cai, Li Liu, Chong Hou, Ning Zhou, Shaowu Pan, Xiangru Wang, Huamin Zhou, Cheng-Wei Qiu, Yan-Qing Lu & Guangming Tao  
*Light Sci Appl* **13**, 48 (2024). DOI: 10.1038/s41377-024-01383-8