

Minchao Cui Honored with Atomic Spectroscopy 2026 Best Paper Award

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The editorial board of *Atomic Spectroscopy* is delighted to present the **2026 Best Paper Award** to Prof. Minchao Cui (Fig. 1) for the highly influential research article "**Physicochemical State Classification of Heat-treated TC4 Samples Based on Laser-induced Breakdown Spectroscopy (LIBS)**". This work, co-authored with Nan Yang, Mengjie Shan, Guangyuan Shi, Haorong Guo, Shilei Xiong, Ming Luo, and Dinghua Zhang, was published in *Atomic Spectroscopy*, 2024, 45(4), 324–335.¹

This annual award recognizes exceptional scholarly contributions evaluated through both scientific merit and citation impact metrics. Under the oversight of the journal's editorial

leadership—including the editor-in-chief, executive editor, and associate editors—recipients are honored with an official certificate alongside a monetary prize of US \$5,000.

According to Essential Science Indicators (ESI) data, the recognized paper has attained "**Highly Cited Paper**" and "**Hot Paper**" designation, ranking within the top 1% and top 0.1% by citation performance in the academic field of Chemistry, based on ESI threshold for its field and publication year. This achievement highlights the research community's appreciation for the work's methodological rigor and its practical value in advancing materials characterization.



Fig. 1 The winner Prof. Minchao Cui.

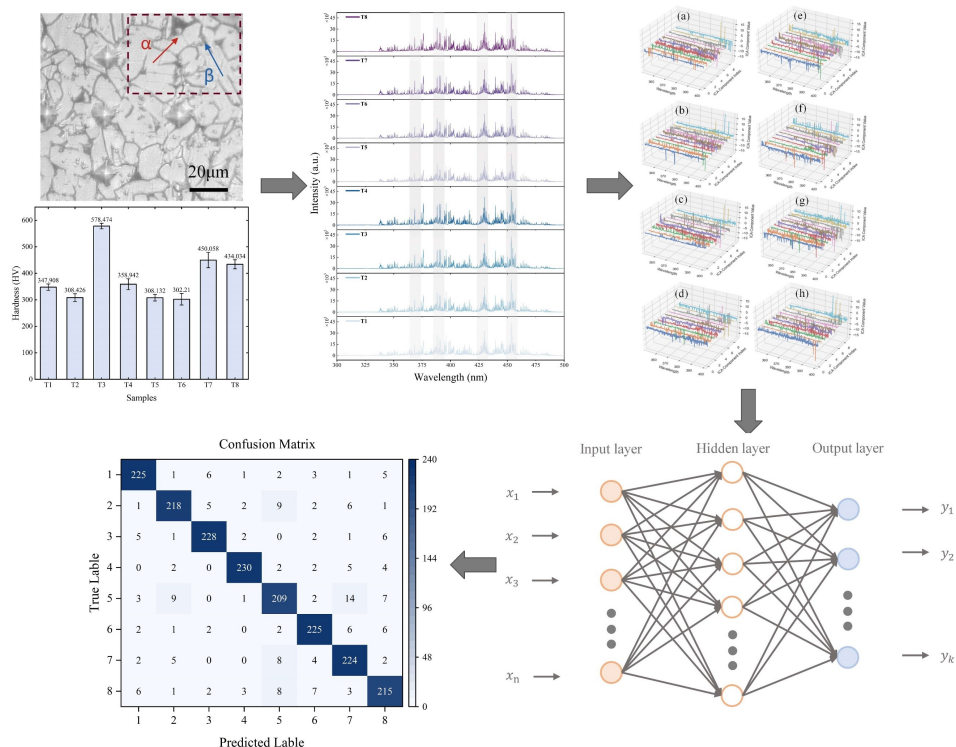


Fig. 2 Story of the award-winning paper.

The award-winning study tackles a longstanding challenge in aerospace materials engineering: developing efficient, non-destructive methods for evaluating the physicochemical properties of heat-treated metallic components. TC4 titanium alloy (Ti-6Al-4V), a widely deployed $\alpha + \beta$ dual-phase alloy in aero-engine blades and structural components, requires precise characterization of microstructure and hardness following thermal processing to ensure optimal performance and safety (Fig. 2).

Prof. Cui's research team introduced an innovative analytical framework that integrates LIBS with independent component analysis (ICA) and deep neural network (DNN) algorithms. The investigators systematically examined eight TC4 samples subjected to varying aging treatments (480°C to 690°C), correlating their microstructural evolution, Vickers hardness variations, and spectral signatures. The established ICA-DNN classification model achieved 91% accuracy with a Kappa coefficient of 0.893, while receiver operating characteristic (ROC) analysis yielded area-under-curve (AUC) values approaching unity for all sample categories—demonstrating robust discriminative capability.

"This research elegantly bridges the gap between fundamental spectroscopic analysis and practical industrial quality control," commented the editorial team of *Atomic Spectroscopy*. "By synergizing machine learning with LIBS technology, the authors have opened new avenues for rapid, intelligent characterization of

thermally processed materials. The journal takes great pride in acknowledging this pioneering contribution."

Prof. Minchao Cui, the corresponding author and awardee from School of Mechanical Engineering at Northwestern Polytechnical University and Shenzhen Cyborg Robot Co., Ltd., shared his reflections: "Receiving this honor is both humbling and encouraging for our entire research group. We set out to create an intelligent detection solution that could meet the demanding standards of aerospace manufacturing while being adaptable to industrial settings. Witnessing the scientific community embrace and build upon our findings has been tremendously fulfilling. I am profoundly grateful to my talented co-authors—especially Nan Yang for her dedicated experimental work—and to our funding sources including the National Natural Science Foundation of China (62375221), National Science and Technology Major Project (2025ZD1606600), and Qinchuangyuan Support Plan in Shaanxi Province of China (QCYRCXM-2022-132). Special thanks also go to *Atomic Spectroscopy* for providing a platform that amplifies high-quality research."

Prof. Minchao Cui earned his bachelor's degree from Xi'an Jiaotong University in 2013 and completed dual doctoral programs at Tokushima University (Japan) and Xi'an Jiaotong University, graduating in 2018 and 2019 respectively. He once served as a visiting researcher at Tokushima University and a professor at Northwestern Polytechnical University. Currently

serving as the vice president of Shenzhen Cyborg Robot Co., Ltd. He holds senior membership in the Chinese Optical Society and foreign membership in the Iron and Steel Institute of Japan. His research centers on Intelligent Laser Manufacturing technologies. Prof. Cui has led numerous research initiatives supported by the National Natural Science Foundation of China and the Ministry of Industry and Information Technology of China, and his scholarly contributions have garnered recognition including the "Outstanding Young Scholar in Engineering Frontiers of China" award from the Chinese Academy of Engineering. He has authored more than 40 peer-reviewed publications in leading journals such as *Small*, *Atomic Spectroscopy*, and *Spectrochimica Acta Part B: Atomic Spectroscopy*.

Apart from the award-winning paper, various other research works have been highly commended by the selection committee and are included in sequence at the conclusion of this editorial.

"Thin Layer Method for LA-ICP-MS Analysis of Trace Elements Concentrates of Germanium Dioxide" by Nikolay S. Medvedev, Valeriya D. Kurbatova, Tatiana Ya. Guselnikova, and Anatoly I. Saprykin, published in Volume 45(1), 2024, pp. 26–32. <https://doi.org/10.46770/AS.2023.256>.²

"Covalent Targeting Drug Mediated Specific Lanthanide Tagging Towards In Situ Bruton's Tyrosine Kinase Quantification Using ICP-MS" by Ruxue Hou, Yuxin Gu, Yang Zhao, et al., published in Volume 45(2), 2024, pp. 74–82. <https://doi.org/10.46770/AS.2024.078>.³

"Micro-XRF Mapping Elucidates the Taphonomy of Two Early Cretaceous Paravian Fossils from Western Liaoning, China" by Yichuan Liu, Qiang Ji, Xuri Wang, et al., published in Volume 45(2), 2024, pp. 123–131. <https://doi.org/10.46770/AS.2024.033>.⁴

"A Review of Development in the Research of Self-Absorption on Laser-Induced Breakdown Spectroscopy" by Yun Tang, Ping Liao, Kai Yang, et al., published in Volume 45(4), 2024, pp. 336–357. <https://doi.org/10.46770/AS.2024.041>.⁵

"Synthesis and Characterization of GO/MOF-199/MoSe₂ for use as a Solid Phase Extractant for Flame AAS Determination of the Speciation of Cr in Natural and Wastewater Samples" by Hassan Elzain Hassan Ahmed, Ali Mohammednour Ali Mohammed, and Mustafa Soylak, published in Volume 45(2), 2024, pp. 132–143. <https://doi.org/10.46770/AS.2024.052>.⁶

"Determination of REEs in Seawater RMs (NASS-7, CASS-6, and NMIJ 7204-A) Using Online Automated Separation ICP-MS Analysis System" by Rui Tong, Haitao Li, Wei Guo, et al., published in Volume 45(2), 2024, pp. 144–149. <https://doi.org/10.46770/AS.2024.027>.⁷

"A New Micro-Solid Phase Extraction Using ZnMnAl LDH Nano-Sorbent for Cu and Ni Determination in Natural Water and Soil" by Hassan Elzain Hassan Ahmed, Zaki S. Seddigi, and Mustafa Soylak, published in Volume 45(1), 2024, pp. 44–55. <https://doi.org/10.46770/AS.2023.310>.⁸

"A Rapid Method for Preparing Hematite Reference Material for In-situ Determination of Iron Isotope Ratios" by Xianli Zeng, Ming Li, Hongyun Jin, et al., published in Volume 45(6), 2024, pp. 532–540. <https://doi.org/10.46770/AS.2024.053>.⁹

"Accurate Determination of Selenium in the Serum by Inductively Coupled Plasma Tandem-Mass Spectrometry" by Huajing Yang, Liang Fu, Jianhua Huang, et al., published in Volume 45(3), 2024, pp. 191–199. <https://doi.org/10.46770/AS.2024.091>.¹⁰

"Robust Soil Total Carbon Prediction Using LIBS: Integrating Expert Knowledge with Machine Learning and External Dataset Evaluation" by Wesley Nascimento Guedes, Diego Victor Babos, Vitor Silveira Freitas, et al., published in Volume 46(2), 2025, pp. 141–149. <https://doi.org/10.46770/AS.2025.018>.¹¹

"Enhanced Chlorine Content Calibration Method for Simultaneous Determination of Apatite U-Pb Age and Trace Elements by LA-ICP-MS" by Guo-Chao Sun, Mao-Yu Chen, Jin-Jing Huo, et al., published in Volume 46(2), 2025, pp. 185–197. <https://doi.org/10.46770/AS.2025.012>.¹²

"Size Matters: Chemical Representativeness of Lunar Impact-Generated Glass Beads" by Bi-Wen Wang, Qian W. L. Zhang, John W. Delano, et al., published in Volume 46(2), 2025, pp. 119–130. <https://doi.org/10.46770/AS.2025.055>.¹³

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On behalf of the Editorial Team of Atomic Spectroscopy

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