EDITORIAL

Inaugural Editorial for the *Optical Wireless Communication*

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As the wave of sixth-generation (6G) communications reshapes the global connectivity landscape, integrated networks spanning space, air, ground, and sea are forming the technological foundation for an intelligent world of ubiquitous connectivity. Within this emerging paradigm, optical wireless communication (OWC) has attracted increasing attention due to its distinctive advantages, including ultra-high data rates, extremely low latency, strong immunity to electromagnetic interference, and high communication security. These features enable OWC to overcome the inherent limitations of conventional radio frequency communications and position it as a key enabling technology for next-generation intelligent networks. From deep space exploration to smart cities, and from cross-media communication in marine environments to the integration with terahertz systems, OWC is redefining both the boundaries of communication technologies and the scope of their applications.

This journal focuses on fundamental research, technological breakthroughs, and engineering applications in the field of OWC. With free space optical communication (FSO) and visible light communication (VLC) as its primary research themes, the journal covers a wide range of emerging topics, including cross-medium optical communication, integrated sensing and communication, and hybrid optical, terahertz, and radio frequency communication systems. The scope of applications extends from deep space communication to smart urban infrastructures, and from marine communication systems to emergency response networks. We recognize that transformative progress in OWC requires not only incremental innovation in photonic devices and efficient algorithmic optimization, but also interdisciplinary collaboration that bridges optical engineering, artificial intelligence, and quantum science. To foster such collaboration, this journal aims to establish a comprehensive platform that integrates theory, technology, and applications, bringing together global researchers to exchange ideas and share achievements. Our goal is to serve as both a forum for scholarly dialogue and a platform for disseminating impactful research outcomes.

The journal adheres to the guiding principles of frontier leadership, innovation driven research, and academic excellence.

- **Frontier leadership.** The journal actively tracks international research developments and prioritizes the publication of contributions that

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open new research directions, propose novel theoretical frameworks, or introduce innovative technologies, thereby providing intellectual guidance for the development of the field.

- **Innovation driven research.** We encourage both fundamental innovation and technological advancement. Submissions addressing critical engineering challenges, such as deep sea terminals, satellite borne optical payloads, and other practical communication systems, are particularly welcomed in order to promote the translation of scientific discoveries into real world applications.
- **Academic excellence.** The journal adopts a rigorous editorial process that includes double blind peer review, final evaluation by the editorial board, and traceability of experimental data. An internationally recognized editorial board ensures high academic standards, while the journal also advocates open science practices, including data sharing and open source code, to enhance research transparency and reproducibility.

We invite submissions presenting significant advances in the following areas, including but not limited to:

1. **Optoelectronic devices and novel device characteristics for OWC.** Research on the design and fabrication of core devices such as lasers, novel photodetectors, and optical modulators, as well as investigations of their performance under high data rate, low power consumption, and extreme environmental conditions including high temperature, high pressure, and strong radiation.
2. **Optical field manipulation and transmission technologies.** Generation, propagation, and communication applications of structured light fields such as vortex beams, vector beams, Airy beams, and Bessel beams. Research on intelligent optical field control using metasurfaces, as well as studies on the propagation characteristics and compensation mechanisms of optical signals in complex media including atmospheric turbulence and underwater environments.
3. **Intelligent algorithms and compensation techniques for OWC.** Applications of artificial intelligence in OWC systems, channel estimation and equalization techniques, adaptive modulation strategies including advanced modulation formats and probabilistic shaping, optimization of adaptive optical systems, advanced tracking methods, multi aperture transmission techniques, and diversity reception schemes.
4. **Cross medium and long distance OWC.** Transmission characteristics and communication technologies in complex environments such as atmospheric turbulence, seawater, smoke, dust, and cross medium interfaces, as well as long distance communication scenarios including inter satellite, satellite to ground, lunar communication, and deep space optical links.
5. **Integrated sensing and communication.** System architectures that combine OWC with positioning, ranging, imaging, and sensing functions, as well as joint transmission frameworks that integrate sensing information, such as target recognition and environmental parameters, with communication data.
6. **System design and engineering implementation of OWC.** Research on acquisition and tracking system optimization, terminal architecture design, tracking algorithms, and reliability verification in practical deployment scenarios including outdoor, satellite borne, and vehicular communication systems.
7. **Hybrid communication technologies.** Integration of OWC with terahertz communication systems, radio frequency communication systems, and other emerging communication paradigms.
8. **Other related topics.**

Optical Wireless Communication aims to serve as an open academic community that connects researchers across disciplines and generations. We welcome experienced scholars who wish to share their insights as well as young researchers who bring fresh perspectives. By promoting dialogue between fundamental research and engineering practice, and encouraging constructive academic debate, the journal seeks to stimulate innovation and accelerate technological progress.

OWC is currently approaching a critical stage of rapid technological expansion. The field is transitioning from laboratory demonstrations to practical deployments in satellite, vehicular, and large scale network environments. As applications extend from isolated scenarios to integrated space air ground sea communication systems, global collaboration becomes increasingly essential. This journal aspires to

illuminate emerging achievements, connect the global research community, and facilitate the advancement of OWC technologies.

We sincerely invite researchers and practitioners to contribute their forward looking ideas, innovative research results, and practical explorations. Together, we hope to advance OWC technologies and contribute to the realization of an intelligent world enabled by ubiquitous optical connectivity.

Optical Wireless Communication

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