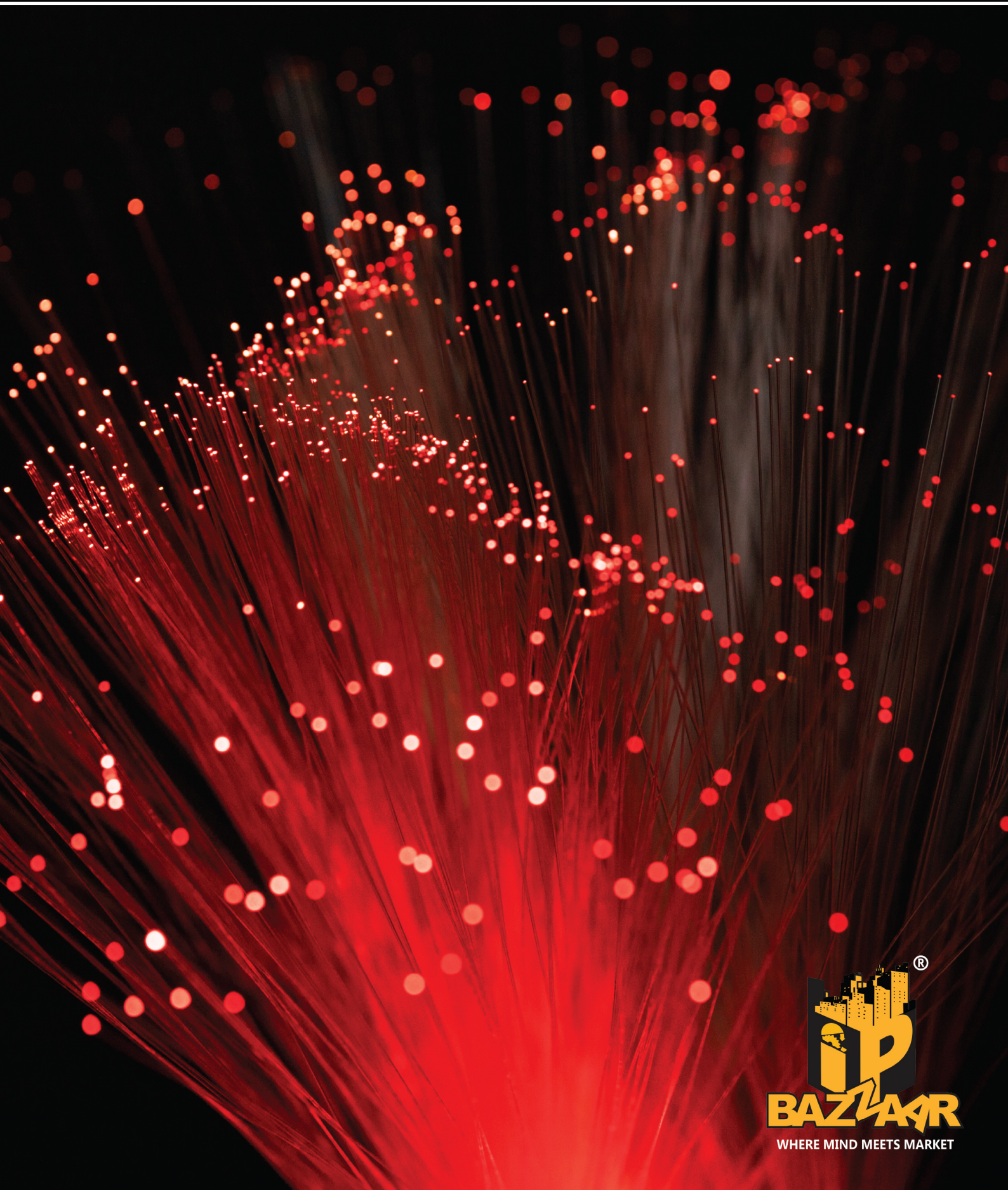


TECH SCAN

HOLLOW CORE OPTICAL FIBER

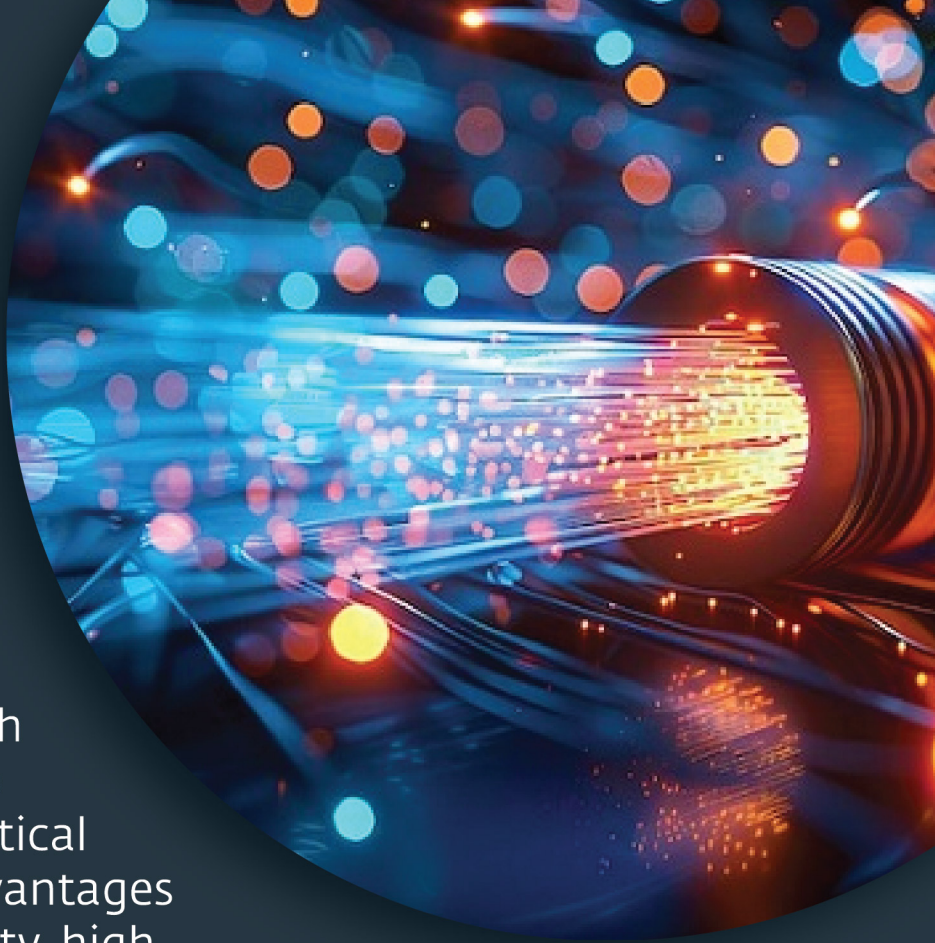


Hollow Core Optical Fiber (HCF) is an advanced optical communication technology in which light travels primarily through a hollow, air-filled core rather than through solid glass. Because light travels faster in air than in glass, HCF can transmit data with lower latency compared to conventional solid-core optical fibers. It may also offer advantages such as reduced nonlinearity, high

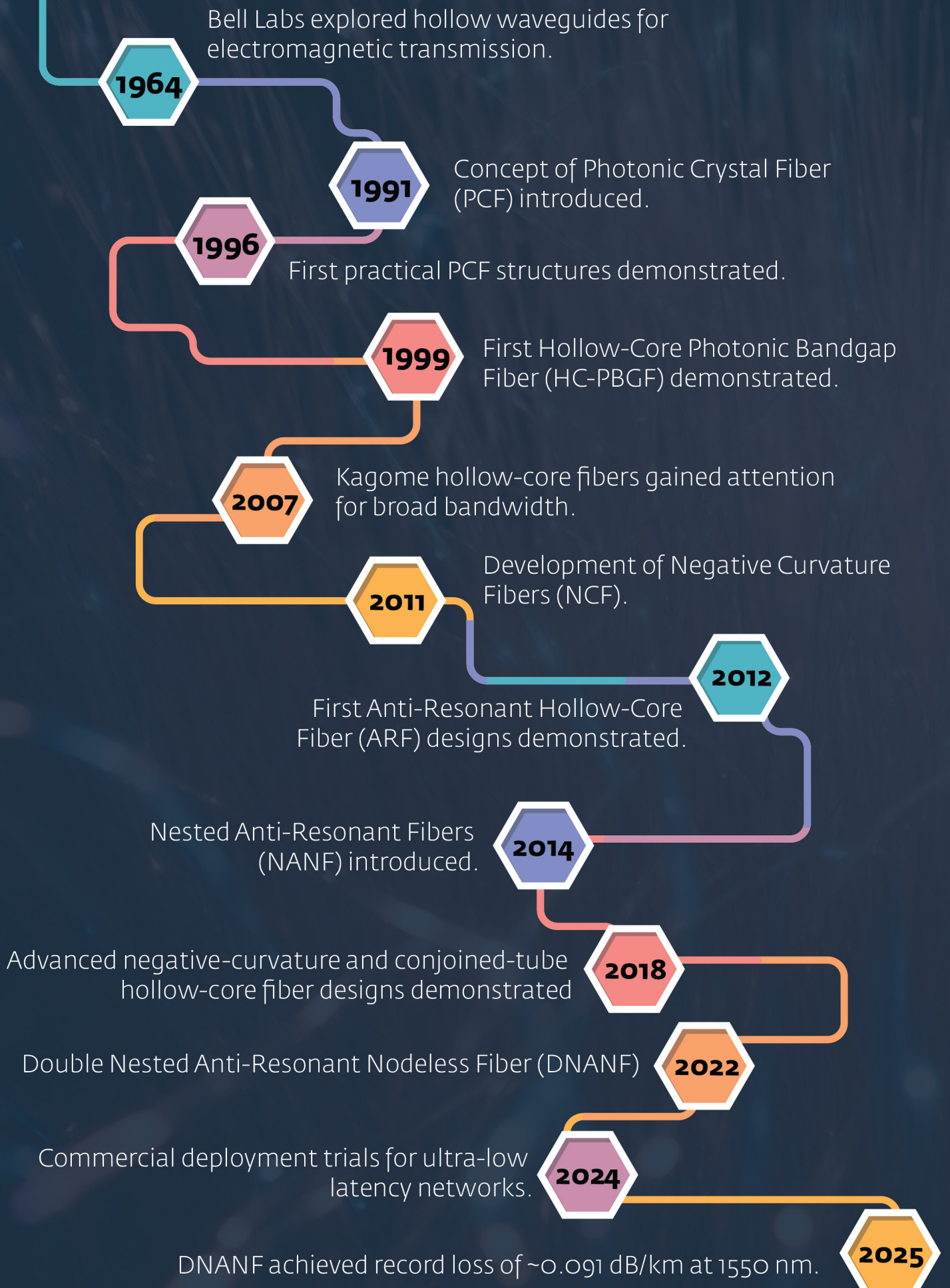
bandwidth capacity, and improved performance in specific high-speed communication applications.

Recent advances in fiber design, fabrication techniques, and loss reduction have made HCF more reliable and increasingly practical for use in data centers, telecommunications networks, cloud computing infrastructure, and future 5G/6G communication systems. Its key advantages include faster data transmission, reduced latency, potential energy efficiency benefits, improved network performance, and the ability to support growing data traffic demands.

As this technology has the potential to significantly impact global communication infrastructure, protecting its intellectual property is highly important. Patents and other IP rights can help safeguard innovative fiber structures, manufacturing processes, system architectures, and commercial applications. Strong IP protection enables organizations to maintain a competitive advantage, prevent unauthorized use of their innovations, and secure returns on research and development investments.



INNOVATION TIMELINE



PATENTABLE COMPONENTS

Fiber Structure and Design - novel hollow-core geometries, anti-resonant or photonic bandgap structures, nested tubes, and designs that reduce loss or improve mode control.

Material Innovations - Covers new glass compositions, coatings, and protective layers that enhance durability, stability, or optical performance.

Manufacturing and Fabrication Processes - methods for preform fabrication, capillary assembly, and fiber drawing with improved precision and scalability.

Performance Enhancement Technologies – Methods to reduce latency, Techniques to minimize dispersion

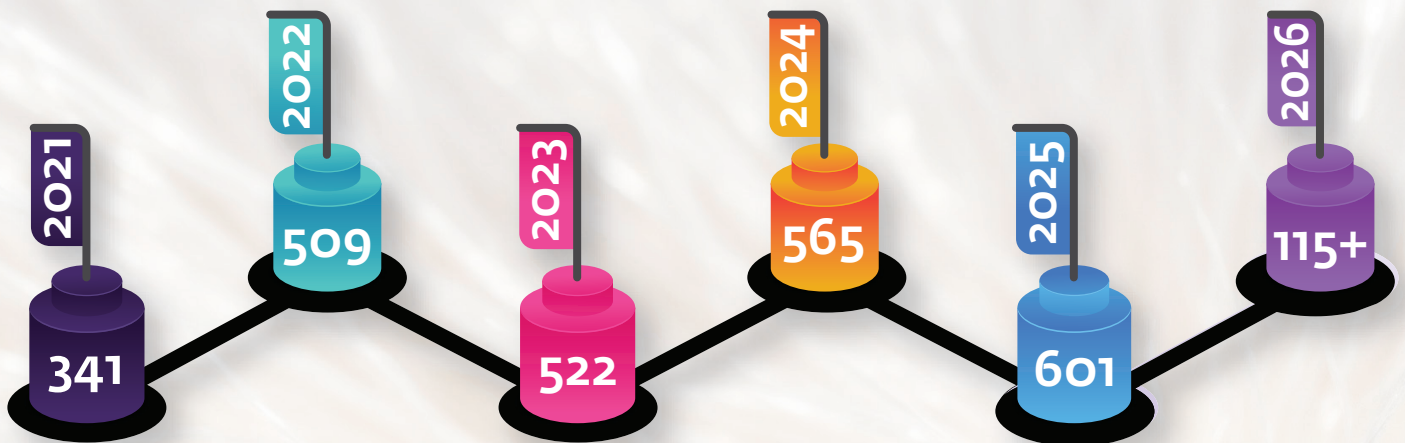
Optical Connectivity and Integration - Technologies enabling reliable connection with other optical systems such as Low-loss connectors and splicing methods, Mode-field adapters and coupling systems and Protective packaging and end structures

Network and System Applications - Data-center interconnect architectures, 5G/6G optical transport systems

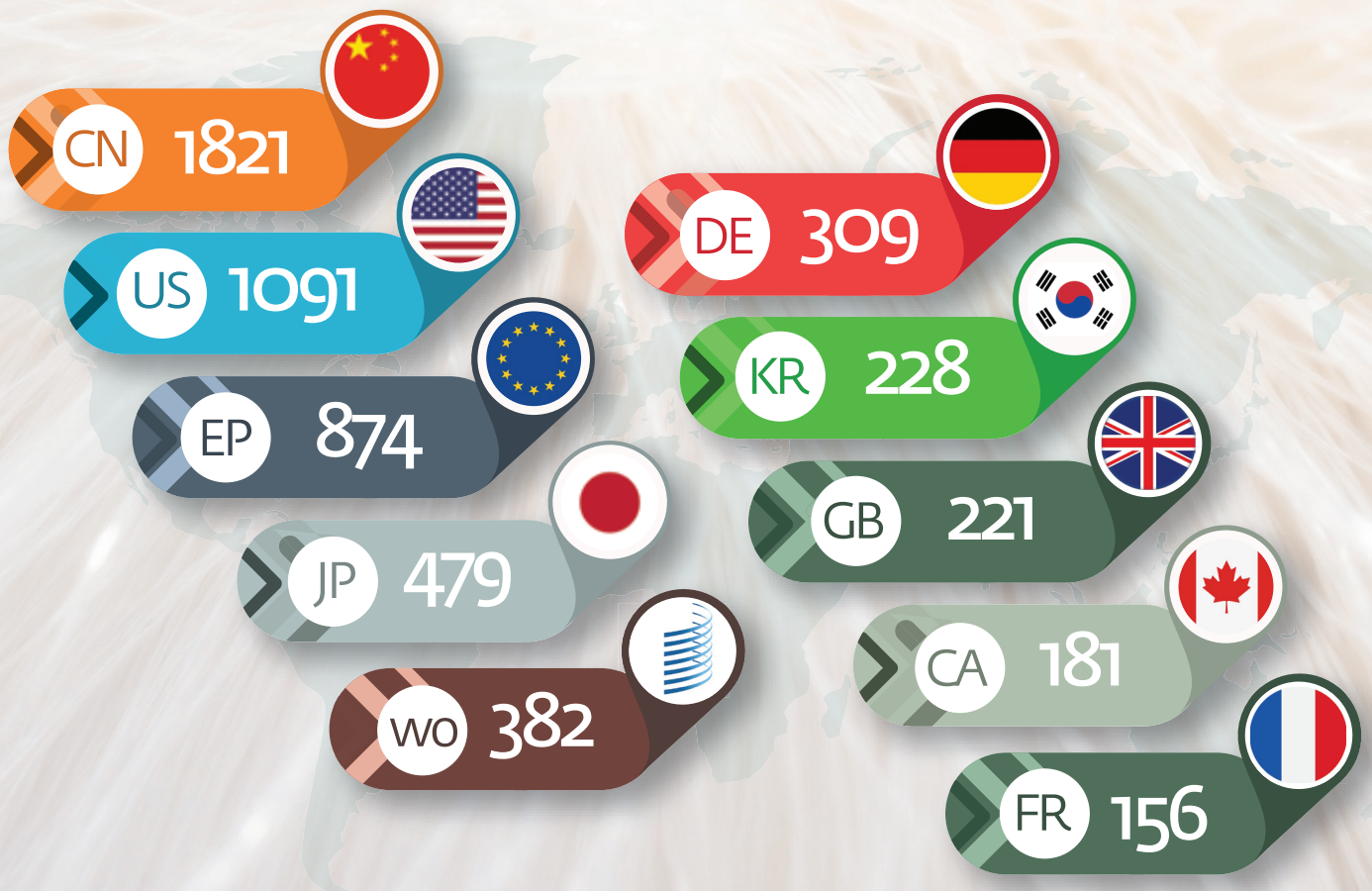
Software and Control Methods - Network optimization algorithms specific to HCF, Signal-processing techniques for HCF transmission, Predictive maintenance methods

Sensing Applications - Gas sensing within the hollow core, Environmental monitoring applications

PATENT STATISTICS



PATENT LANDSCAPE



Database: Questel Orbit

Data Range: 01/06/2021 - 01/06/2026

TOP APPLICANTS

120

ASML

76

YANGTZE OPTICAL FIBRE & CABLE

66

HALLIBURTON ENERGY SERVICES

56

FUJIFILM

43

BEIJING UNIVERSITY OF TECHNOLOGY

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GUILIN UNIVERSITY OF ELECTRONIC TECHNOLOGY

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MICROSOFT TECHNOLOGY LICENSING

30

CHINA MOBILE COMMUNICATIONS

28

SHANGHAI INSTITUTE OF OPTICS & FINE
MECHANICS - CHINESE ACADEMY OF SCIENCES

27

CORNING

Database: Questel Orbit

Data Range: 01/06/2021 - 01/06/2026

NOTABLE INNOVATIONS

Patent Application	Priority date	Title	Assignee
US3095258	1962-06-22	Melt spinning process for producing hollow-core filament	DU PONT DE NEMOURS
US3538452	1965-04-12	Laser switching device	OPTICS TECHNOLOGY
GB1481455	1973-09-28	Fibre-optic devices	AMERICAN OPTICAL
US4764194	1986-06-19	Method of manufacturing hollow core optical fibers	3M FIBER OPTIC PRODUCTS
US5221308	1988-09-21	Low loss infrared transmitting hollow core optical fiber method of manufacture	3M
US6993230	2003-08-01	Hollow core photonic band gap infrared fibers	US NAVY
KR101299135	2011-08-18	Reflective probe type apparatus for detecting gas and method for detecting gas using optical fiber with hollow core	KOREA INSTITUTE OF SCIENCE & TECHNOLOGY
CN104181648 B	2014-07-07	Hollow-Core Photonic Crystal Fibers gas absorption cell and preparation method thereof	SHANGHAI INSTITUTE OF OPTICS & FINE MECHANICS - CHINESE ACADEMY OF SCIENCES
CN104181648 B	2015-12-23	Hollow core optical fiber and a laser system	NKT PHOTONICS
JP7485253 B1	2022-11-11	Hollow core fiber and method for producing hollow core fiber	SUMITOMO ELECTRIC INDUSTRIES



WHITESPACES

Automated
Capillary Stacking

Real-Time
Defect Detection

Low-Loss
HCF Splicing

Radiation-
Resistant Coatings

High-Volume HCF
Manufacturing

Field-Installable
HCF Connectors

HCF
Data-Centre
Cabling

Harsh-Environment
Fibre Coatings

Quantum
Communication
HCF

6G HCF
Infrastructure

HCF-Optimized
Transceivers

If you would like to learn more about any of these areas or have specific questions, we're here to provide further information and insights. Our team is dedicated to driving progress and staying at the forefront of Hollow Core Optical Fiber.

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