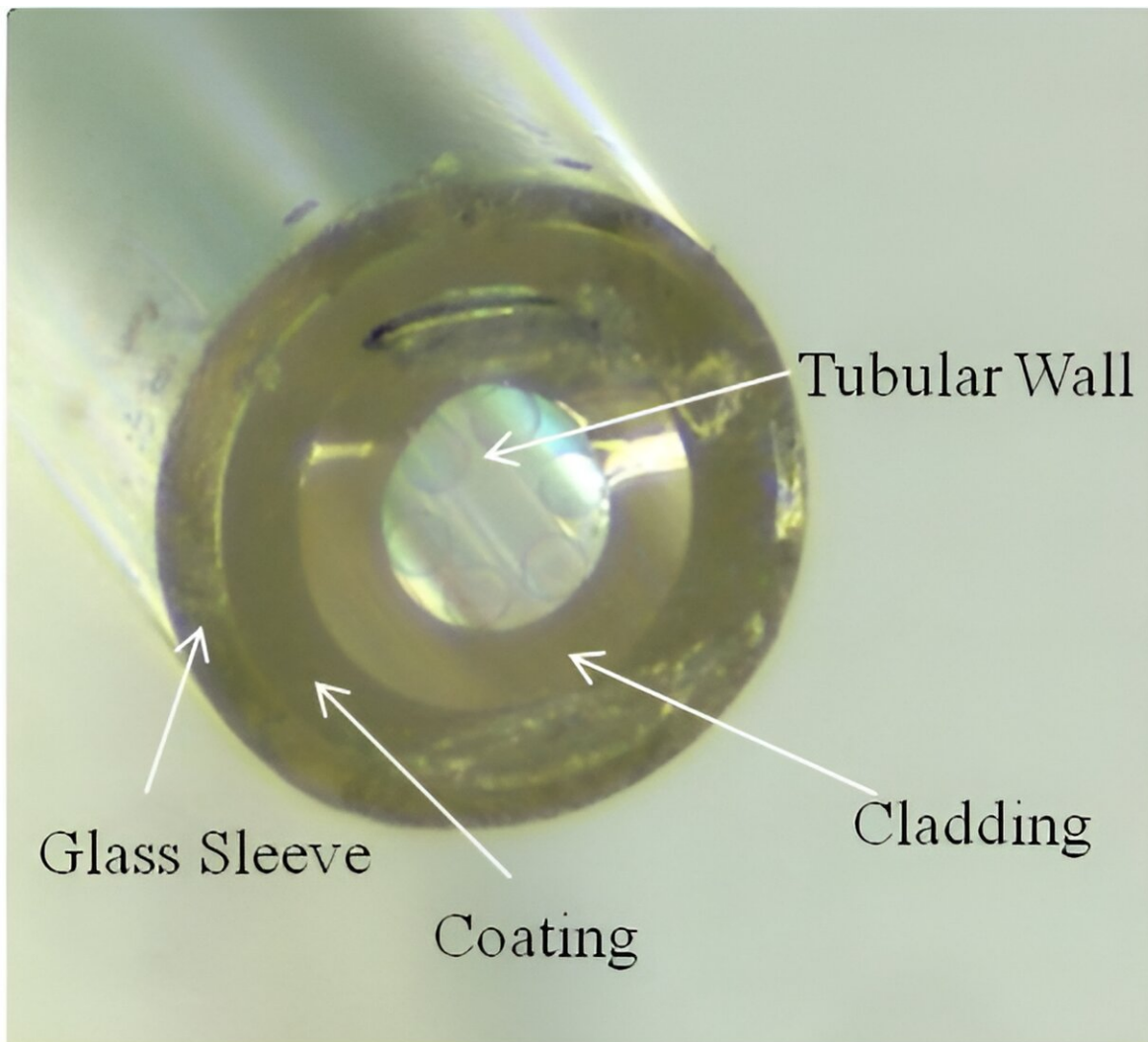


# High-efficiency hollow-core optical fiber cable for medical procedures

March 21 2024, by Zhang Nannan

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AR-HCF cross section structure. Credit: Huang Lei

A research group led by Prof. Jiang Haihe from the Hefei Institutes of Physical Science of the Chinese Academy of Sciences has designed a 6-hole microstructure anti-resonant air-core fiber (AR-HCF) with a larger core diameter of 78  $\mu\text{m}$ .

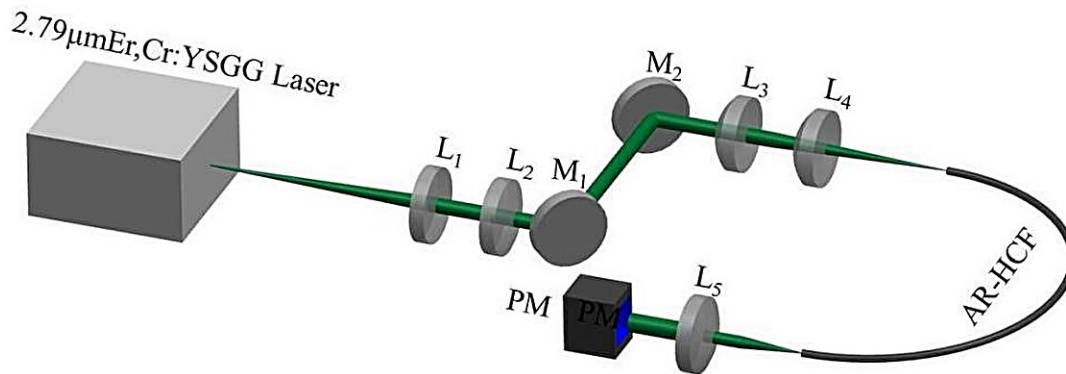
"This is the first time that 2.79  $\mu\text{m}$  high-energy pulsed [laser](#) has been transmitted with good efficiency at [room temperature](#)," said Prof. Jiang. The [study](#) was published in *Optics & Laser Technology*.

Traditional medical laser devices often face challenges such as complex structures and low efficiency. The AR-HCF overcomes these problems with its simple design, high transmission efficiency, and flexibility.

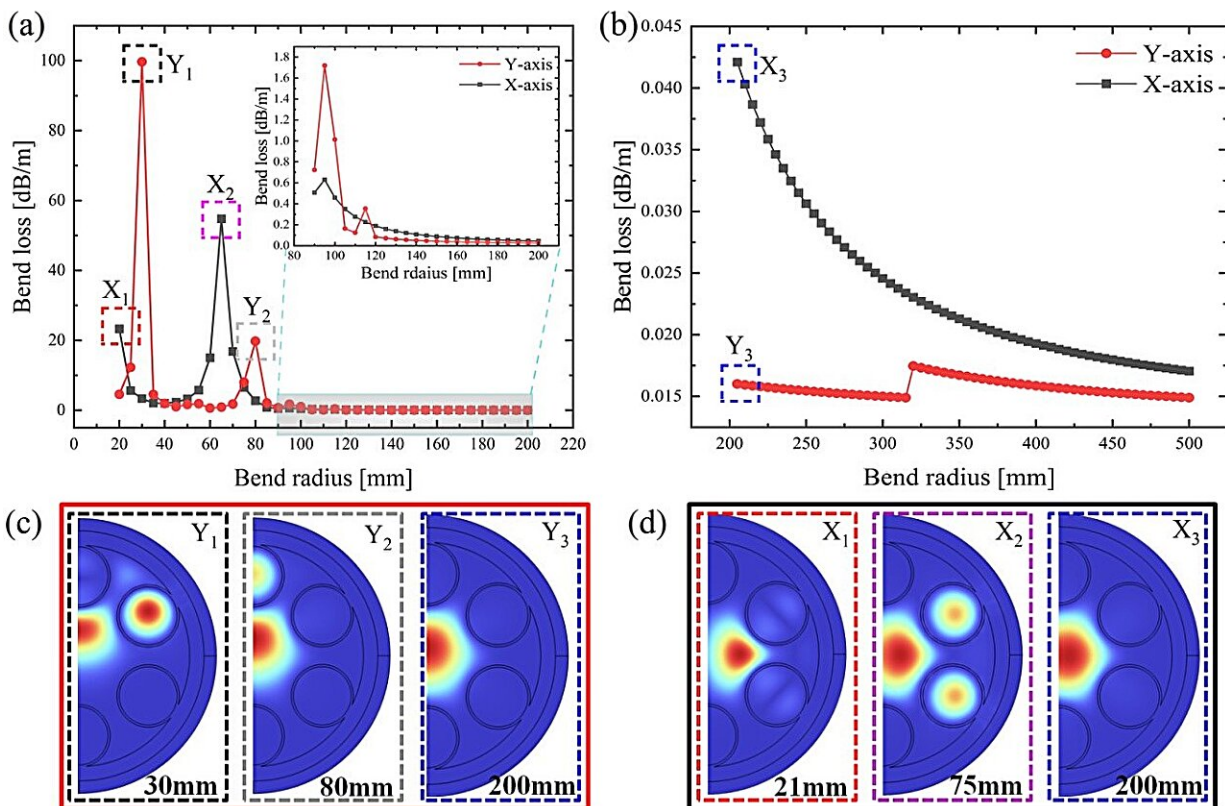
In this study, the researchers designed a simple structure with high coupling transmission efficiency, high damage threshold, and flexible transmission AR-HCF to replace the light guide arm in laser energy transmission.

With an average coupling transmission efficiency of 77.3% and a maximum of 85%, the optical fiber cable system shows impressive performance.

This innovation enables efficient transmission of high-energy pulsed lasers, particularly in the mid-infrared range, which is critical for [medical procedures](#).



The 2.79  $\mu\text{m}$  AR-HCF space transmission experimental device. Credit: Huang Lei



AR-HCF loss at different bending radii and bending directions. Credit: Huang Lei

**More information:** Lei Huang et al, High-efficiency 6-hole structure anti-resonant hollow-core fiber 2.79  $\mu\text{m}$  Cr,Er:YSGG high-energy pulse laser transmission system, *Optics & Laser Technology* (2024). [DOI: 10.1016/j.optlastec.2024.110743](https://doi.org/10.1016/j.optlastec.2024.110743)

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