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Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped La_2O_3-Al_2O_3-SiO_2 glass double clad fiber for C+L amplification

Zhuoyuan Huang, Weichao Ma, Tong Wu, Jiaao Lu, Jiantao Liu, Changming Xia*, Zhiyun Hou, Guiyao Zhou
South China Normal University
Email: xiacmm@126.com

Recently, C+L (1530-1625 nm) fiber amplifiers have been attracting more attention in the field of optical communication. In this paper, Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped La_2O_3-Al_2O_3-SiO_2 (SAL) glass for the fiber core was prepared using the conventional melting method. Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped double clad fiber was successfully fabricated by the stack-and-draw technology. The fluorescence properties of the fiber were experimentally investigated. The result suggested Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped double clad fibers are a potential material for C+L amplification.

Double clad fiber preform was fabricated using the stack- and-draw technology. The diameter of the fiber is ~240 μm and the doped core region diameter is ~24 μm.

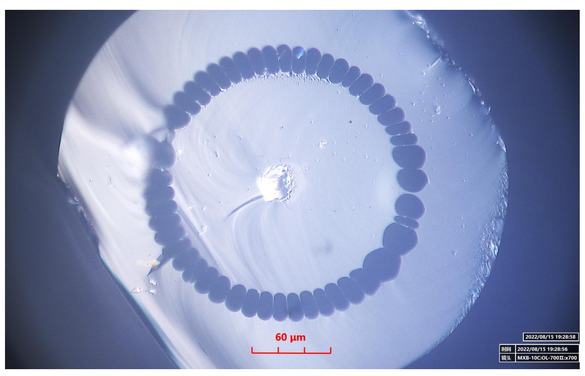

Figure 1. Cross section of double clad fiber

The glass with the composition of $0.1Er_2O_3$-$0.2Pr_6O_{11}$- $0.3Yb_2O_3$-$69.4SiO_2$-$21Al_2O_3$-$9La_2O_3$ (mol%) for fiber core was prepared using the conventional melting method. Its absorption spectrum and near-infrared emission spectrum under a 976 nm laser are shown in Fig.2 and Fig.3.

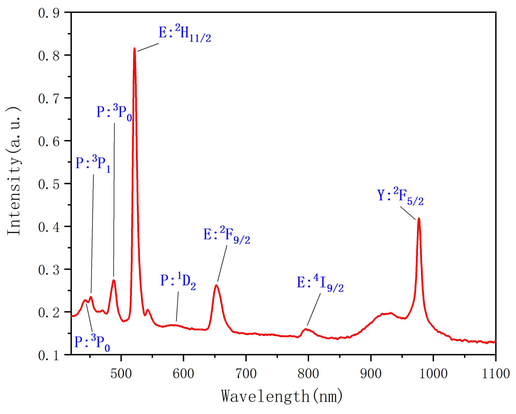

Figure 2. Absorption spectrum of Er^{3+}-Pr^{3+}-Yb^{3+} - SAL glass

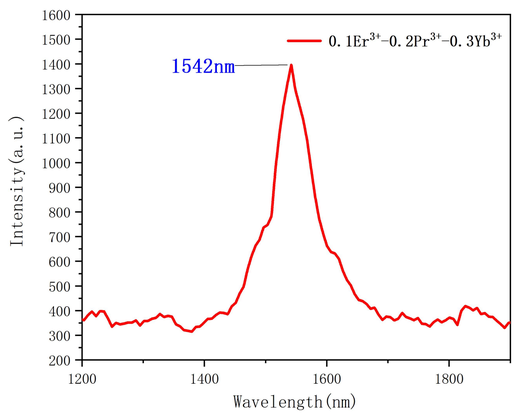

Figure 3. Near-infrared emission spectrum of Er^{3+}-Pr^{3+}-Yb^{3+} - SAL glass

To investigate the near-infrared emission property of the prepared double clad fiber, the optical measurement was carried out. Figure 4 shows the experiment setup of double clad fiber. Figure 5 shows the emission of the Er^{3+}-Pr^{3+}- Yb^{3+} tri-doped double clad fiber. The near-infrared emission can cover the whole C+L wave band and the broadband emission FWHM centered at 1598 nm is up to 110nm. It suggests that Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped fiber is a promising host material for C+L amplification.

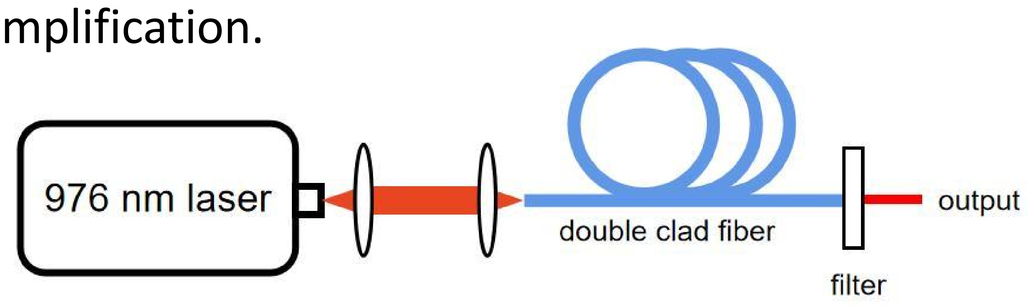

Figure 4. The diagram for measuring the fluorescence of Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped double clad fiber

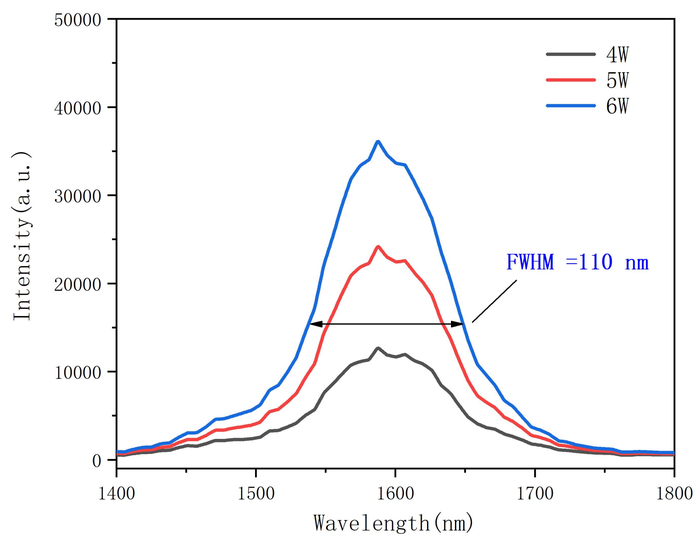

Figure 5. Near-infrared emission spectrum of the Er^{3+}-Pr^{3+}-Yb^{3+} tri-doped double clad fiber under a 976 nm excitation

The C+L amplification experiment is in progress. It will be reported before long.

華南師範大學
SOUTH CHINA NORMAL UNIVERSITY