

Laboratory of Optical Fibres Technology, Faculty of Chemistry Maria Curie Skłodowska University (UMCS)

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History

- 1975 first optical fiber – multicomponent glass
- 1978 silica glass optical fiber
- 1979 optical fiber telecommunication line was installed (5th in Europe)
- 2001 technology of microstructured optical fibers (5th in World)

Staff (9):

Dr. Paweł Mergo - head

Dr. Wiesław Podkościelny – POF technologies

Dr. Małgorzata Gil – new materials

6 scientific workers

Research focused on development of new optical materials and technologies of new kinds of specialty fibers (silica and high silica glasses, polymers) for sensing and optical communication



Equipment

- MCVD and FCVD lines – preform fabrication (high silica glasses)
- Fiber drawing towers (silica glass, polymers), silica glass consolidation tower
- Laboratory of optical polymers - extrusion line
- Chemical laboratories for synthesis and purification raw materials
- Measurements laboratories for materials and optical fibers characterisation
 - Netch thermal analysis station (TA with QMS and FTIR)
 - Optical spectrum analyzer
 - NKT Photonics SuperK Versa,
 - Zwick Roel mechanical testing station
 - Vytran fiber-optic splicer,
 - Climate chambres (-70 - +120C),
 - York P102 Preform Analyser
 - SEM Phenom



Realized Projects

6 international projects in last 10 years



6 FP: European Network of Excellence on Micro-Optics, NEMO, 2005-2009



7 FP: PHOSFOS (Photonic Skins For Optical Sensing) EC FP7 STREP project, 2008-2011



7 FP: ACTMOST-Micro-Optics Access Center, 2010-13



ACTION P11: *Physics of linear, nonlinear and active photonic crystals*, 2005-2008

ACTION 299: *Optical Fibres for New Challenges Facing the Information Society*, 2008-2010

ACTION TD1001, Novel and Reliable Optical Fibre Sensor Systems for Future Security and Safety Applications 2011-14

ACTPHAST (7FP EU)

Access Center for Photonics Innovation Solutions and Technology Support

www.actphast.eu

TRIPOD (7FP EU)

Traning and Research in Polymer Optical Devices

www.tripod.eu



+ 6 national projects in last 10 years

Ongoing Projects

H2020-ICT-2016-2017	ACceleraTing PHotonics innovAtion for SME's: a one STop-shop-incubator ACTPHAST 4.0
2. Konkurs polsko-berliński w obszarze fotoniki (NCBiR)	Półprzewodnikowe źródło pojedynczych fotonów do bezpiecznej światłowodowej komunikacji kwantowej w zakresie $1.3\mu\text{m}$
MAESTRO 8 (NCN)	Spiralne światłowody fotoniczne do zastosowań w metrologii i komunikacji optycznej
Strategiczny program badań naukowych i prac rozwojowych "Nowoczesne technologie materiałowe"- TECHMATSTRATEG (NCBiR)	Nanostrukturalne światłowody fotoniczne do kilkumodowej propagacji nowej generacji



Ongoing Projects

ICT-04-2018 (H2020)	ACceleraTing Photonics Deployment viA one STop shop Advanced Technology Access for Researchers ACTPHAST 4R
Program Operacyjny Inteligentny Rozwój 2014-2020	NLPQT- Narodowe Laboratorium Fotoniki i Technologii Kwantowych
Program Operacyjny Inteligentny Rozwój 2014-2020	Moduły światłowodowe o kształtowanej charakterystyce dyspersyjnej do zastosowań w przestrajalnych źródłach promieniowania optycznego
Program Operacyjny Inteligentny Rozwój 2014-2020	Innowacyjne światłowody dedykowane do integracji ze strukturą kompozytu polimerowego wzmacnianego włóknem węglowym do zastosowań w nowoczesnych systemach diagnostyki strukturalnej o wysokiej rozdzielcości
Program Operacyjny Inteligentny Rozwój 2014-2020	Światłowody dedykowane do bezpiecznego przesyłania danych w systemach transmisyjnych wykorzystujących multipleksację optyczną
Program Operacyjny Inteligentny Rozwój 2014-2020	Nowe związki kompleksowe lantanowców dla technologii światłowodów do laserów włóknowych i wzmacniaczy optycznych
Premia na horyzoncie (H2020)	Akceleracja innowacji fotonicznych dla MSP: one-stop-shop inkubator
Program Operacyjny Wiedza Edukacja Rozwój 2014-2020	Zintegrowany UMCS – specjalność „Technologie fotoniczne i światłowodowe”



Colaborations

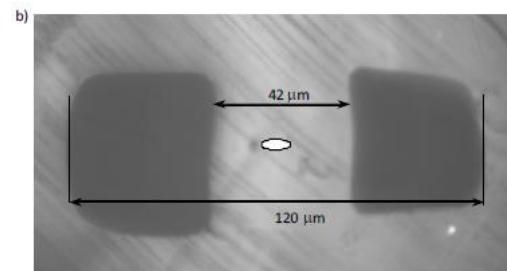
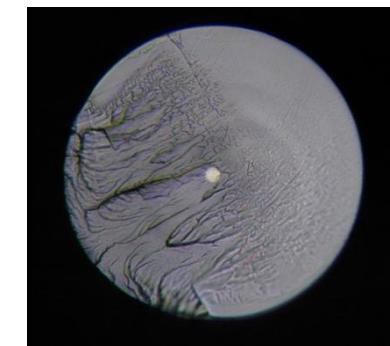
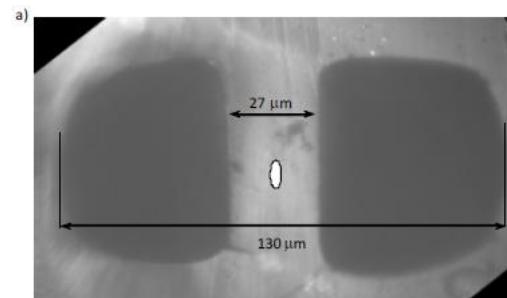
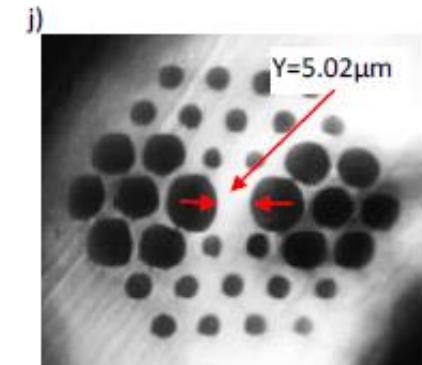
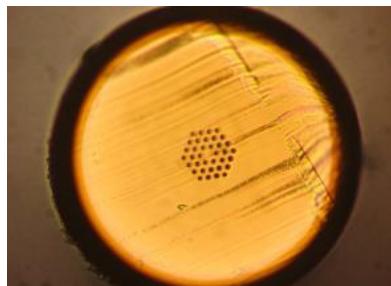
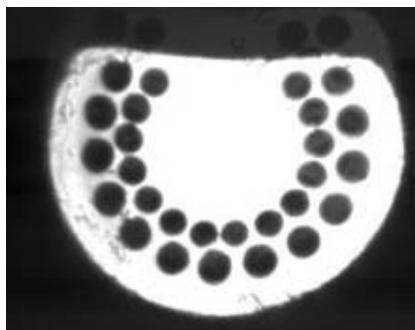
- Fiber Optics Group, WrUT, Poland
- Applied Physics and Photonics, TW-TONA, VUB, Brussel, Belgium
- IPHT, Institute of Photonic Technology, Jena, Germany
- INESC Porto, Porto, Portugal
- Aston University, Great Britain
- DTU Photonics, Denmark



mPOF fibers

Several technologies were elaborated which allow for fabrication of different conventional and microstructured polymer fibers for the following applications:

- Signal transmission in visible range
- Transmission of polarized light, interferometric and polarimetric sensing
- Bragg and long period gratings inscriptions
- UV detection
- SPR sensing

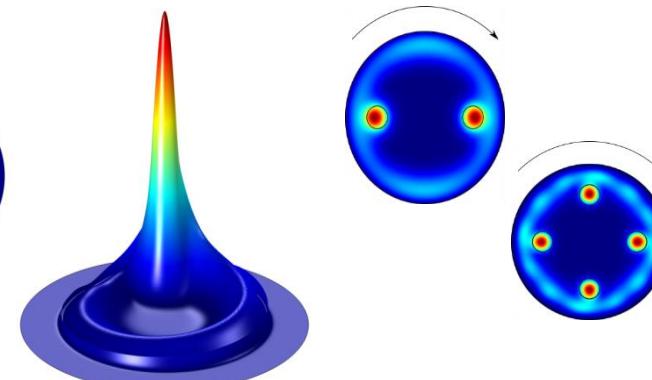
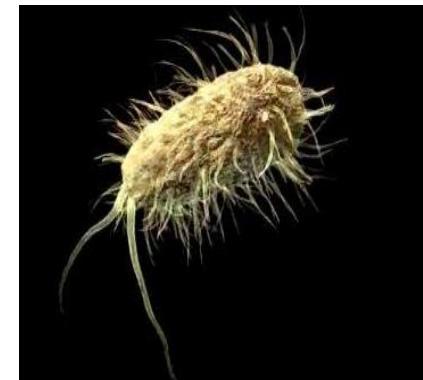
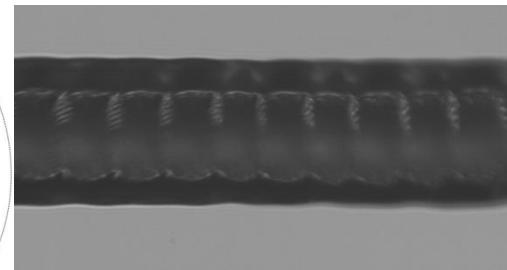
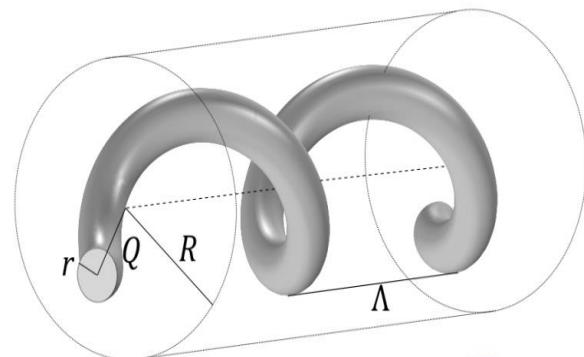


Qualitative and quantitative assessment:

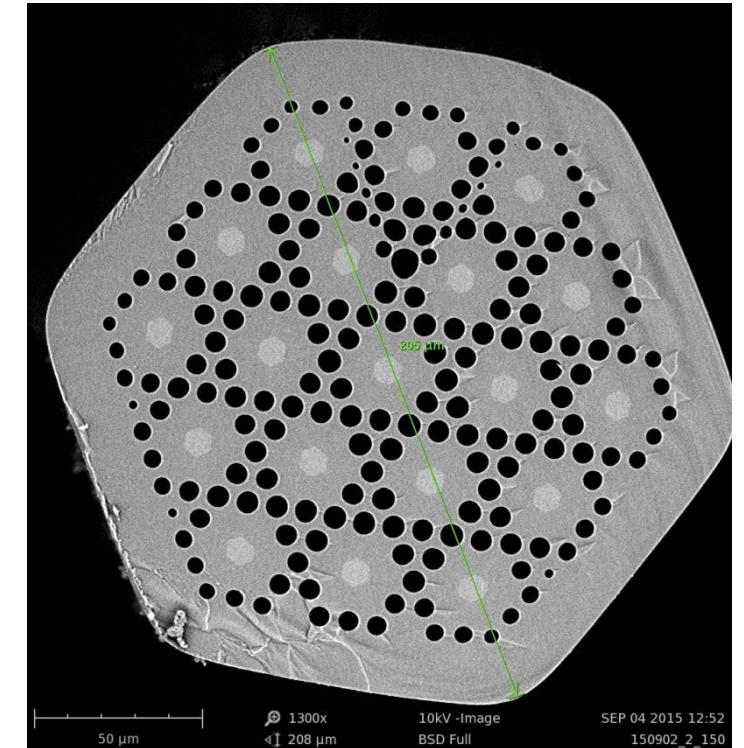
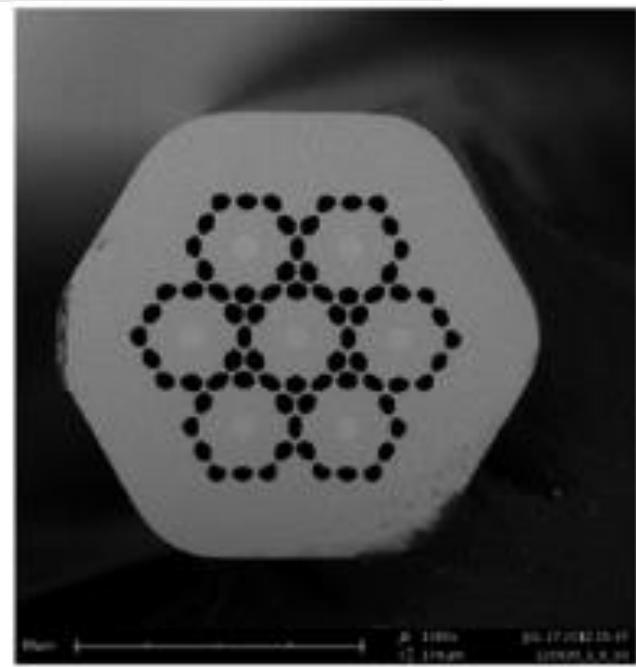
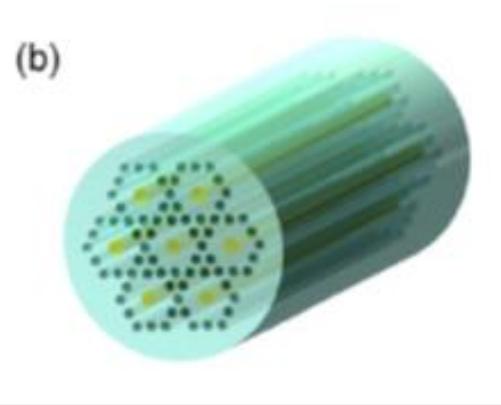
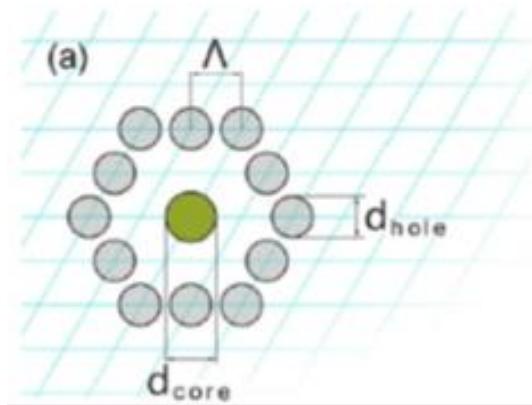
- ✓ DNA, proteins, toxins, antibodies,
- ✓ viruses,
- ✓ bacteria,
- ✓ cells,



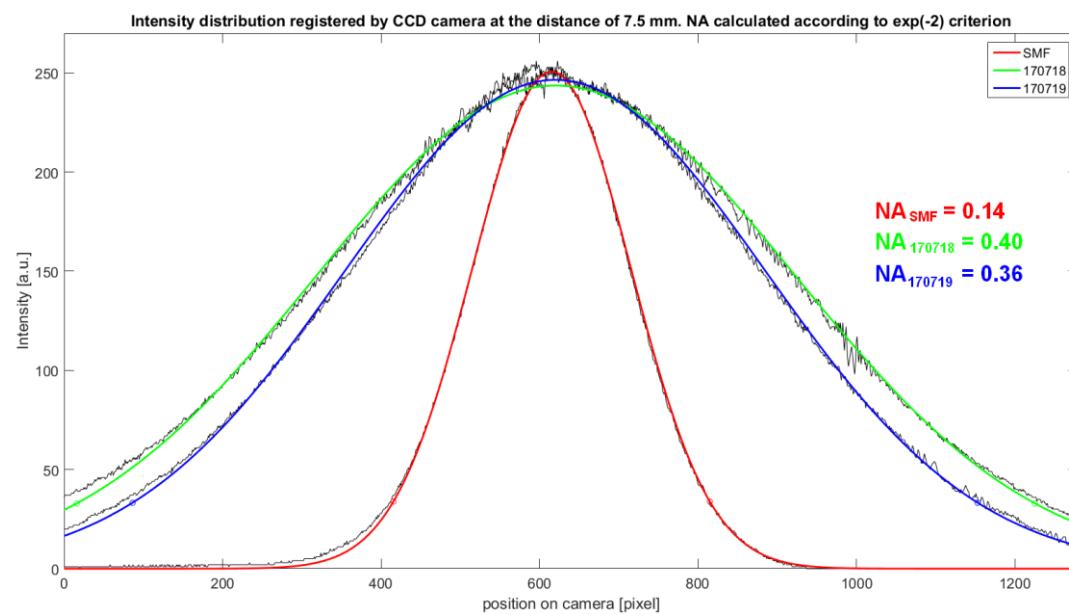
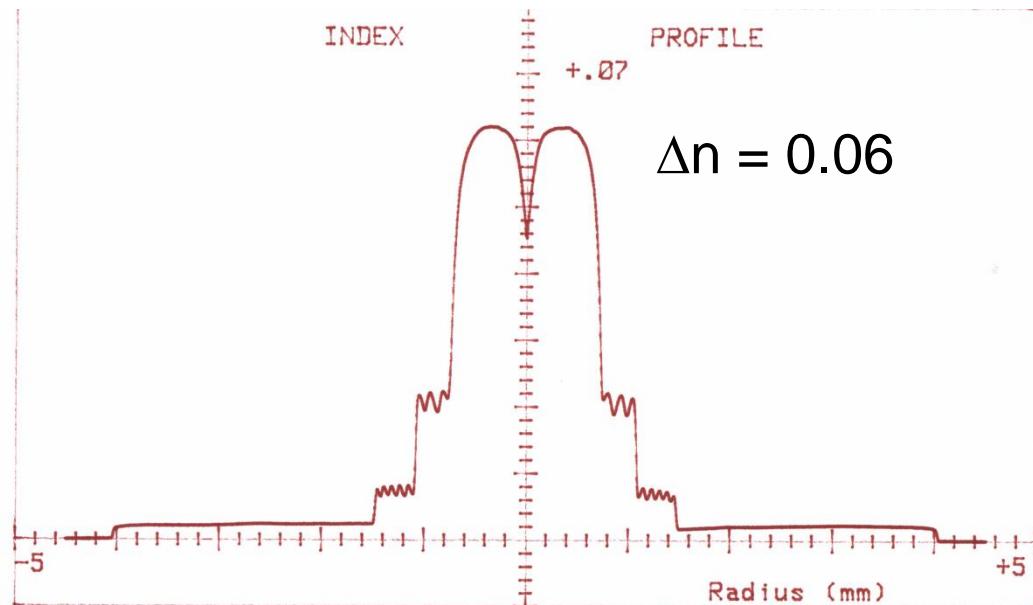
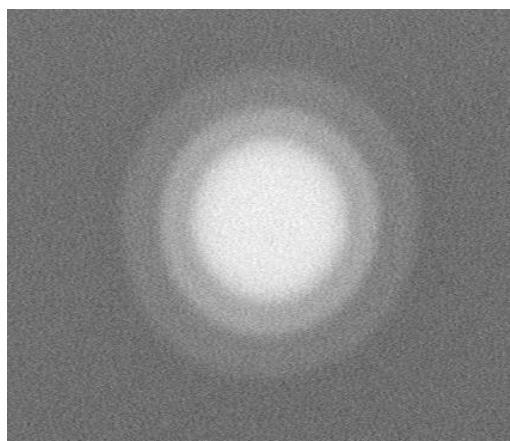
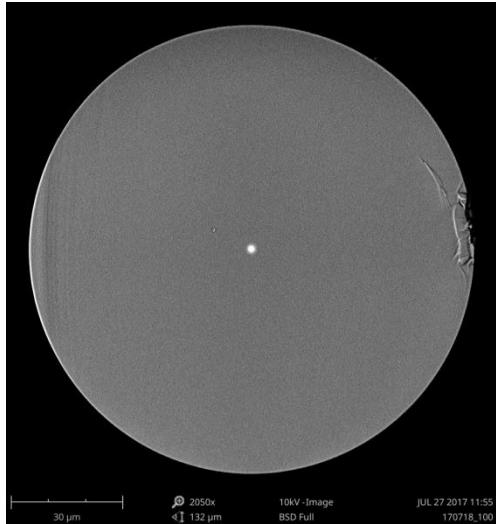
Helically twisted fibers



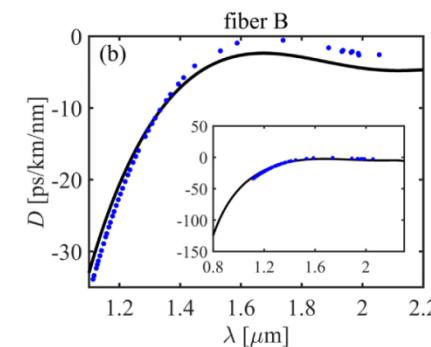
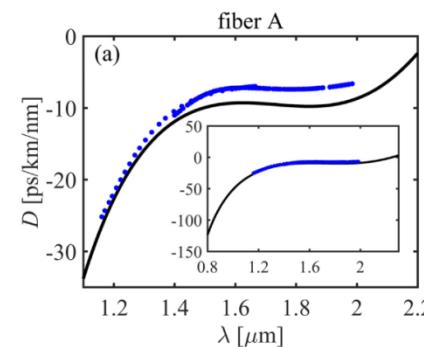
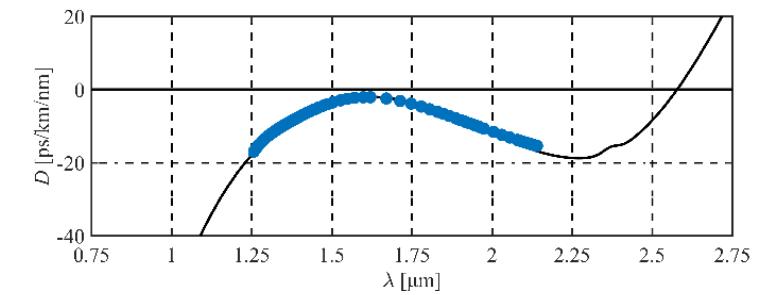
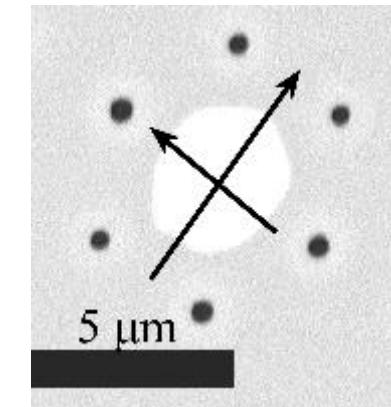
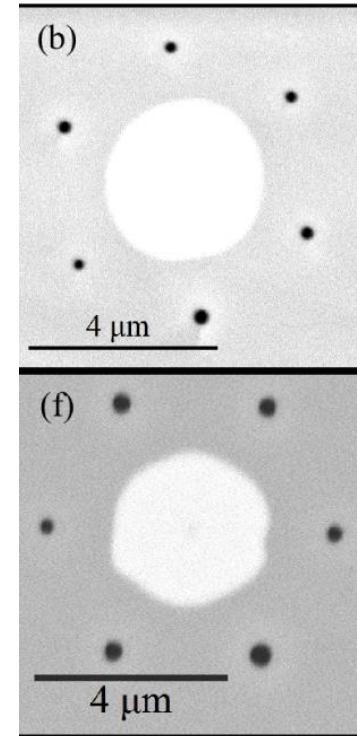
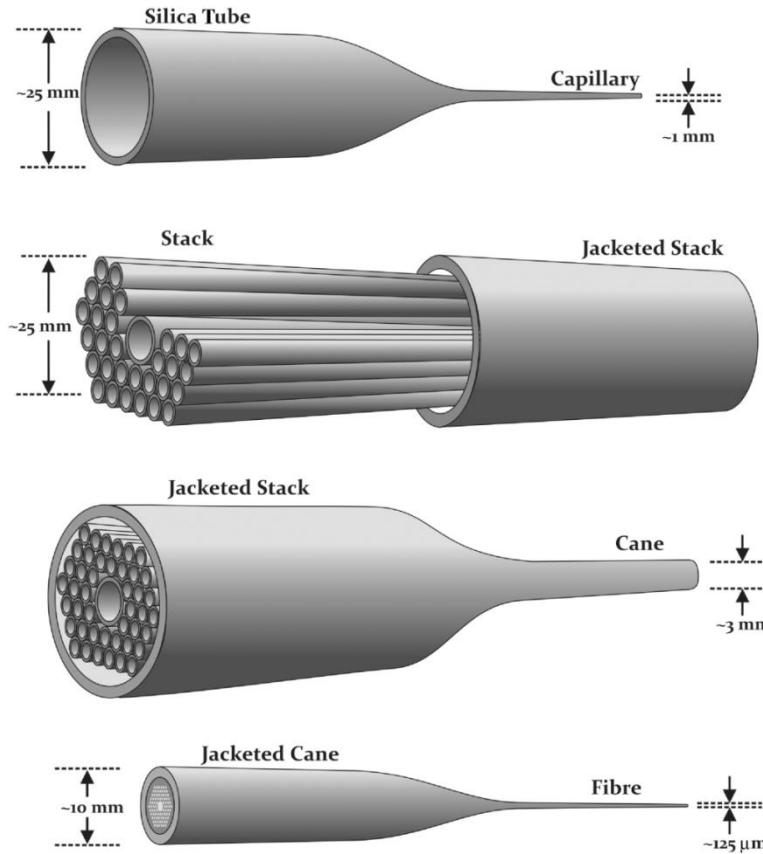
Multicore fibers for telecom



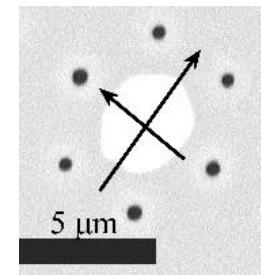
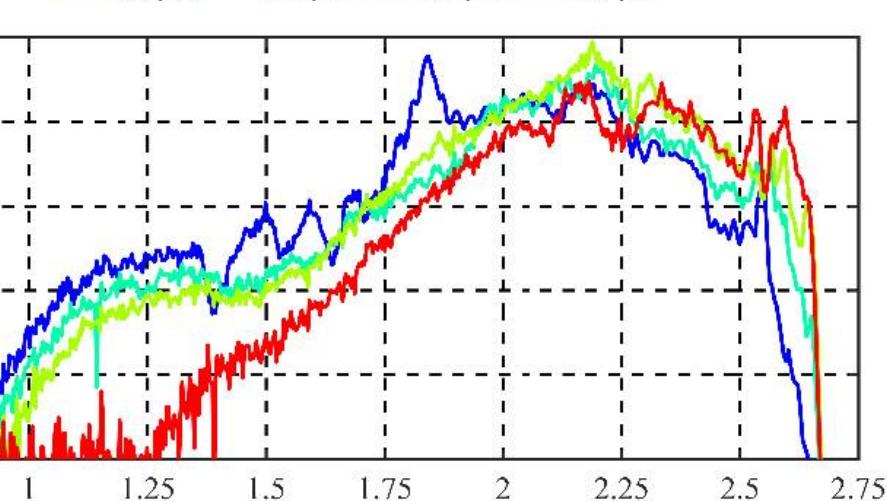
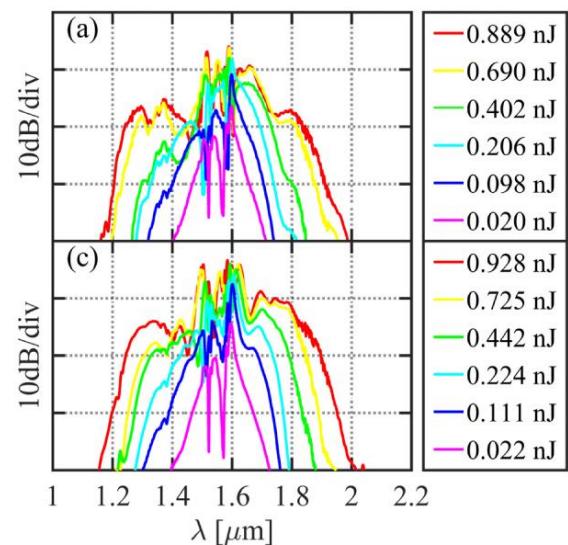
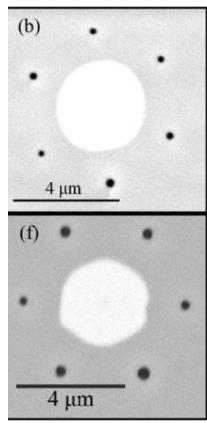
Fabricated high NA fibers



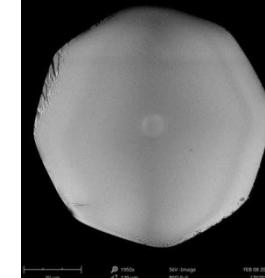
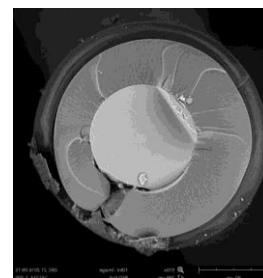
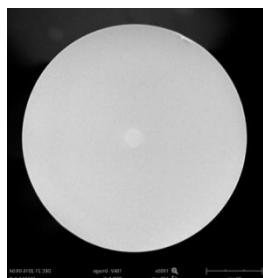
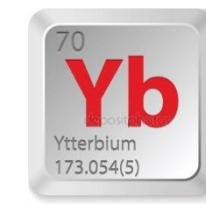
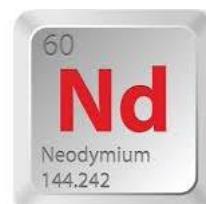
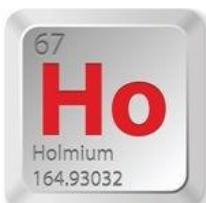
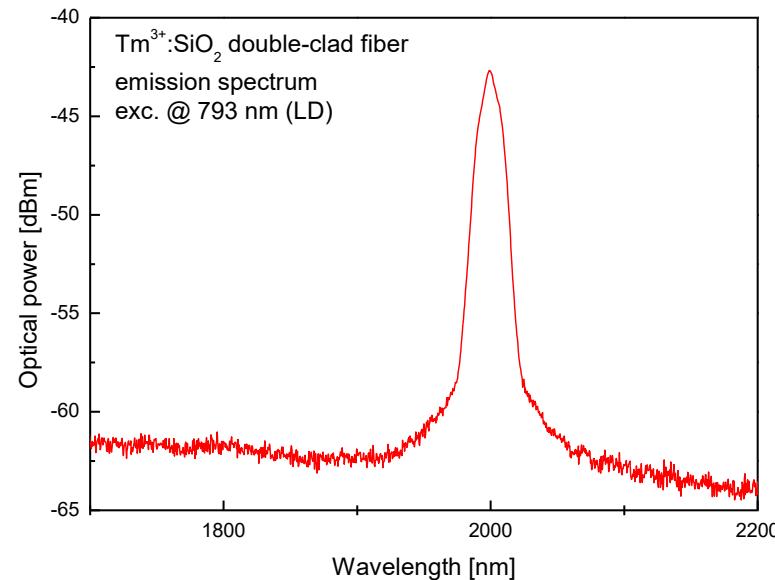
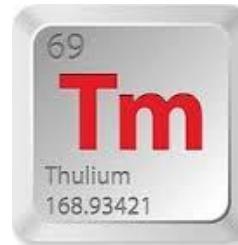
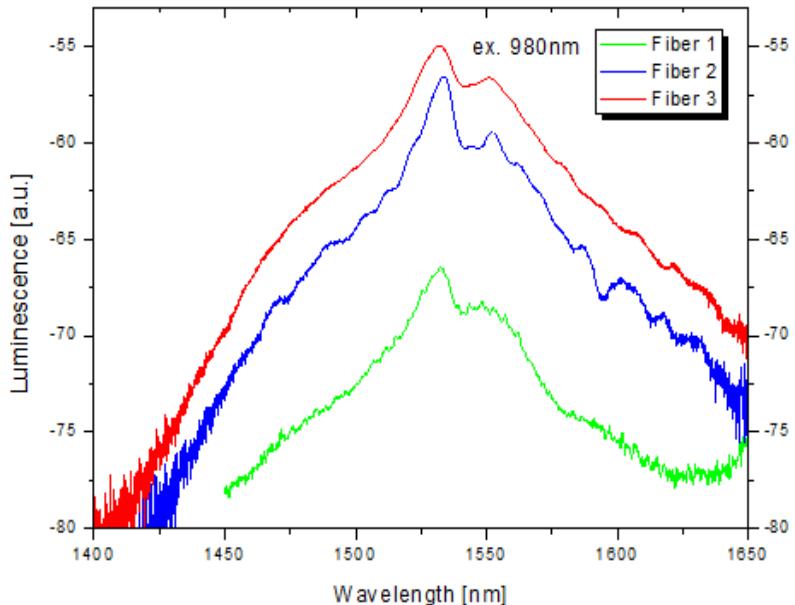
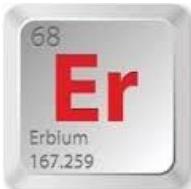
Micro- and nanostructured optical fibers fabrication



Micro- and nanostructured optical fibers fabrication



RE^{3+} doped optical fibers





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Thank you for your attention !

