INTERVIEW THIERRY ROBIN,

CTO iXblue Specialty Fibers division, on Erbium/Ytterbium doped optical fibers

About Thierry Robin

Thierry started his carrier as a research assistant at the Space Vacuum Epitaxy Center at the University of Houston, Texas, where he was involved in the development of a Laser ablation technique for thin film deposition of YBCO high temperature superconductors. He later joined Alcatel's optical fiber R&D group in 1992 where he held his first position in the Optical fiber business as an MCVD process specialist. Within the Alcatel group, Thierry held several positions in R&D, industrialization and production for both singlemode and multimode optical fibers. In 2000 he jumped onboard a then start-up, Highwave Optical Technologies, where he was in charge of the production and development of specialty optical fibers, such as rare-earth doped, double clad and polarization maintaining fiber.
In February 2006, he co-founded iXfiber, now known as the Photonic Solutions division of iXblue, where he serves as Chief Technology Officer. Overall, Thierry plowed his way continuously in the field of optical fiber for the past 25 years... and counting! Thierry studied Physics at the University of Houston. He authored or co-authored 7 patents and over 70 articles in scientific reviews and conferences.

How long has iXblue been involved in EY double clad fibers?

When iXfiber was created in 2006, most of the team had some experience with Erbium-Ytterbium co-doped double clad fibers. We rapidly identified that customers were looking for new EY fibers exhibiting high Power Conversion Efficiency (PCE), low 1 µm spurious emission and drawn with a high performance low index coating.
So we started almost from scratch and addressed these issues over the course of the past 11 years resulting in a complete line of high performance EY fibers today.

EY is well known for Optical fiber amplification for telecom and CATV applications, how do you see this market evolving?

Our development effort was initially driven by telecom applications. Both our 6 and 12 µm core diameter fibers have been optimized for CATV amplifiers with output power of a few Watts. PCE of 50% are routinely obtained in production for these fibers with extremely low 1 µm parasitic emission and tight absorption specifications, which enable high production yields for our customers. Some of our fibers are also optimized so as to obtain minimal tilt on the output spectrum. Historically, our main customers were European based laser manufacturers, some of these in close vicinity to our production site in Brittany, but in the past few years, we have experienced a fast growth of our sales worldwide and more specifically in China.

Any other active market?

Yes, the demand for Lidar sources for wind velocimetry for example and lately for autonomous vehicles has been pushing our development toward large core fibers up to 30 µm core diameter. For the latter market the 1.5 µm emission, being eye-safe clearly points towards EY sources.

The demand for high power CW sources has also been picking up; some of our customers building 1.5 µm sources in the 20-30W range. We have done extensive R&D to improve both the core composition and the low index coating package in order to bring this technology up to our customers' expectations. The main challenges concern photo-degradation within the very active core of the fiber and pump guidance degradation through deleterious low index coating degradation due to the high thermal load of these fibers. Even with an optimized PCE, 50% of the pump power will be absorbed by the fiber resulting in a large temperature increase that will have to be dealt with by a proper thermal management scheme.

What about Space Optical Communications?

We are pursuing our development in this area by financing our second PhD thesis in a row on the subject.
Over the past 7 years, we have developed a comprehensive product line of Erbium and EY double clad fibers. Our fibers can now be used in applications up to 10W in the space radiative environment suffering minimal power degradation. We do have Erbium doped fibers in space aboard more than 30 satellites and our EY radhard fibers are due to fly in the upcoming months.
Space grade fibers is clearly one of our preferred niche market... and the dog, as we see it, is getting bulky.

What would be the major strengths of iXblue?

We are an independent manufacturer of fiber and optical components and therefore not competing with our customers. Mastering both fiber and Bragg grating technologies gives us an edge for matched solutions.
We have long ago implemented a Manufacturing Execution System to manage our production and therefore have a complete control of the product manufacturing version with exhaustive traceability of both process and raw material. We also have a proven quality record with an extremely low non-conformity rate for shipped products. Most of our customers rank iXblue first in specialty fiber suppliers in our yearly quality assessment poll.

When it comes specifically to EY fibers, our customers especially appreciate first the high PCE obtained without sacrificing the 1 µm emission; internally, we are very proud of our coating package that exhibits excellent environmental performances.

After 11 years, do you still discover new things on EY fibers?

Surprisingly, yes. Pushing the fiber to its limits in terms of output power and core temperature unearthed hidden limitations rooted to the very chemistry of the active core.
One should remember as well that a specialty fiber can be 'special' from characteristics not limited to the core waveguide; in other words, we keep improving the fiber through coating enhancement for instance... So watch out for new EY fibers in the near future. ■