

Q&A: Biophotonics in Europe

Better, faster, more cost-effective and less invasive – these are wish-list keywords for just about any life sciences researcher, clinician, medical technician or patient. They also are the buzzwords driving the biophotonics industry. Even as the European economy succumbed to the downturn of recent years, biophotonics as a market segment did better than some others. *BioPhotonics* magazine asked several European companies for a candid look at how the market is doing these days and where the technology is likely to take us in the future.

Our respondents were Dr. Mark Browne, director of Andor Technology plc's Systems Div. in Belfast, UK; Dr. Sergi Ferrando i Margalet, director of R&D at Monocrom SL in Vilanova i la Geltrú, Spain; Rafael Porcar Guezenc, CEO of Cosingo – Imagine Optic Spain SL in Barcelona; professor Karsten König, CEO of JenLab GmbH in Jena and Saarbrücken, Germany; and Sergey Sokolov, deputy director general of Inject Enterprise in Saratov, Russia.

All of the above companies are heavily involved in biophotonics. Andor's products include Neo, a scientific CMOS camera, and Mosaic, an active illumination instrument using digital mirror devices for microscopy, optogenetics and other photostimulation applications. Monocrom offers lasers for eye surgery as well as products for skin cancer and prostate hypertrophy treatments, dental scanning and more.

Among other devices, such as microscopes, JenLab makes clinical multiphoton tomographs based on femtosecond laser technology, including the Prism Award-winning MPTflex. Cosingo makes a new optical detection platform – merging the latest of plasmonics, microfluidics and heat-shock proteins for early cancer diagnostics – and also offers the MicAO, a system that enhances the performance of standard microscopes and extends adaptive optics benefits to nonexpert users.

Inject Enterprise produces pulsed quasi-continuous-wave laser diodes, and linear and stacked arrays with various wavelengths for laser illumination applications such as nanoparticle illumination in laser thermal therapy and laser fluorescence assay.



Inject Enterprise offers a quasi-continuous-wave diode laser stacked array for biophotonic applications.

Q: How would you say the European market has been in the past few years for biophotonics?

Browne: Variable, but Andor has seen strong growth resulting from product innovation and resultant gains in market share.

Sokolov: The market for semiconductor lasers in the field of biophotonics [has been] actively developing in the past few years. The sales volume of semiconductor lasers applied in laser therapy increased greatly.

Ferrando i Margalet: The main market for lasers in the biomedical sector [previously] was related to beauty or aesthetics (hair removal, tattoo removal). It later expanded to other applications, such as skin cancer treatment, pain relief and surgery – in particular, eye surgery, where there is a demand for pulsed green lasers.

König: [The market is] growing – in particular, in cell biology and nanobiotech: nonlinear microscopy and GFP in cells/animals. ... [It also is] growing in medicine – in particular, femtosecond eye procedures and optical biopsies.

Q: Which application areas would you say are thriving – and why?

Browne: Live-cell imaging, because it



Cosingo's optical detection platform merges the latest of plasmonics, microfluidics and heat-shock proteins for early cancer diagnostics.

is the environment in which to evaluate protein expression, localization and protein-protein interactions. [Also,] transgenics for photoactivation of channels.

Q&A Panel

Name	Title	Company	Headquarters
Dr. Mark Browne	Systems Division Director	Andor Technology plc	Belfast, UK
Dr. Sergi Ferrando i Margalet	Director of R&D	Monocrom SL	Vilanova i la Geltrú, Spain
Rafael Porcar Guezenc	CEO	Cosingo	Barcelona, Spain
Professor Karsten König	CEO	JenLab GmbH	Jena and Saarbrücken, Germany
Sergey Sokolov General	Deputy Director	Inject Enterprise	Saratov, Russia

Sokolov: Laser therapy is actively developing, thanks to medical methods developed by Russian medical researchers and their positive experience in such fields as stomatology therapy, laser magnetic ophthalmology therapy. Another area of growing laser therapy application in Russia is veterinary medicine; for instance, for treatment of cow mastitis.

König: Cosmetic eye surgery – in particular, in Asia. More Asians than Europeans/Americans have eye problems. [Also,] high-resolution-imaging non-linear optical biopsies.

Porcar Guezenc: We are amazed to see that photonics is continuously breaking established barriers, such as the diffraction limit, to image more precisely.

Q: Where do you think the market is going for biophotonics?

König: [It will] replace conventional biopsies, replace mechanical flap instruments.

Porcar Guezenc: Biophotonics is getting mature, and for diagnosis, monitoring, therapy – and also in the case of nonmedical segments such as biometric devices – the field is now able to offer an alternative to previously established technologies. As biophotonics is more and more pervasive in our lives, it should allow us to maintain high growth rates for the years to come.

Browne: Superresolution will become important as users see new scientific opportunities. Spinning disk confocal will undergo some significant changes in the next few years as better white-light instruments emerge and competition escalates in laser-based technologies. Selective (or single) plane illumination microscopy (SPIM) is already emerging as an important technique for developmental biology.

Q: What do you see as the “next big thing” in biophotonics?

Browne: Optogenetics – *Nature Methods*’ Method of the Year 2010 ...

Sokolov: As “the next big thing” in biophotonics, we see wide research and convincing research results in such fields as nanophotonics – laser illumination of nanoparticles in laser thermal therapy and laser fluorescence assay.

Porcar Guezenc: This is truly a hard question. So many technologies have been announced as the next big thing too early. “Next big thing” is about scaling down light-based functionalities: tweeze, cut, move, heat, sensing the size of biological elementary particles to interact more efficiently. The next big thing will be very small. The next big thing shall work outside the research lab.

Ferrando i Margalet: The next big thing will be the explosion of biophotonics in an even broader range of applications,



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