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White Papers in Biophotonics

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There are many biophotonics devices and technologies that already contribute to understanding life and generating human wellbeing, and the future opportunities are great. The global community of biophotonics researchers continuing to advance these technologies year on year are in need of feedback on their efforts — direction, advice, and the pull of end users. We need guidance on what the problems to be solved look like in the first place, and then feedback on the usefulness of, or defects in, our devices and solutions. A select group of biophotonics world leaders gathered last year in Perth, Australia, to strategize, learn from each other, and plan for the future, with some of the lessons learned reported here.

The 5th International Conference on Biophotonics (ICOB) was held from 30 April to 2 May 2017. ICOB is a different sort of conference — as usual, there were technical talks, with associated papers published in SPIE's Digital Library (Vol. 10340) but, less usually, there was a focus on where the field is heading — on strategic roadmapping in biophotonics. This focus was ideally complemented by ICOB running back to back with the local annual Western Australian conference Science on the Swan — in large part, a meeting of potential and actual end users of biophotonics technologies. Delegates were afforded the rare chance to hear from opinion leaders representing both the generators and consumers of biophotonics technologies, whose interactions are critical in shaping the future of biophotonics.

ICOB featured plenaries from visionary SPIE CEO Eugene Arthurs on global prospects for biophotonics and from ex-NASA astronaut Stephen Robinson, from the University of California at Davis on biophotonics opportunities for space. And it shared the Science on the Swan opening featuring local Nobel Laureate Barry Marshall. It also featured an exciting outreach event for high school students highlighting the importance of STEM and how it connects to biophotonics. Stephen Robinson and “the Naked Scientist,” Chris Smith, hosted the event organized by the local University of Western Australia OSA student chapter, which showed students how to build an origami microscope, how to see under the skin

using light, and instructed them on the dangers to eye safety of green laser pointers. ICOB also featured a session on biophotonics publishing, with speakers representing SPIE, OSA, and the Springer Nature group.

From the ten conference sessions, four session leaders have chosen to distill their session contents into a focused discussion of specific topics — a white paper: part informative guide, part blueprint for the future.

We commence with a paper looking at the big picture biophotonics research agenda and how to set it, arising from the session led by Laura Marcu, from University of California, Davis (<http://doi.org/10.1117/1.JBO.23.2.021103>). Next, we drill down into the specific application area in optical imaging technologies for intraoperative surgical and tumor margin assessment, arising from the session led by Stephen Boppart, from the University of Illinois at Urbana-Champaign (<http://doi.org/10.1117/1.JBO.23.2.021104>). Entrepreneurship leader and medical doctor Peter Santa-Maria led a brainstorming activity in teaching medical doctors and engineer/scientist entrepreneurs how to frame a research project around a clinical unmet need, and has produced a paper on biomedical device innovation methodology in biophotonics (<http://doi.org/10.1117/1.JBO.23.2.021102>). And lastly, with translation always high on the ICOB agenda, Jürgen Popp, the Director of the Leibnitz Institute of Photonic Technology, caps off the set with a focus on models to promote translation and the challenges we face (<http://doi.org/10.1117/1.JBO.23.2.021101>).

So, I commend to you this set of four perspectives on our field — each with a different focus and magnification, each providing a snapshot of the state of the art, and individual perceptions, issues, and roadmaps of where to go next.

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