

## Mathias Kolle, Ph.D.

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**SCIENTIFIC INTERESTS:** Optics and photonics, multifunctional biological materials, biomineralization, soft matter, biomimetics, bio-imaging, instrumentation development, optical modeling, nanofabrication, self-assembly, materials science, biosensors, optics in underwater environments, morphogenesis of biological photonic systems

### EDUCATION:

- 2001 – 2006 B.S. & M.S. in physics with honors, trinational undergraduate program  
Saarland University, Saarbrücken, Germany  
Henri Poincaré University, Nancy, France  
University of Luxembourg, Luxembourg
- 2006 – 2010 Ph.D. in physics, University of Cambridge, Cambridge, UK

### PROFESSIONAL EXPERIENCE:

- 2013 – present Assistant Professor, Mechanical Engineering Department, MIT
- 2010 – 2013 Humboldt Postdoctoral Research Fellow, School of Engineering and Applied Sciences, Harvard University

### SELECTED HONORS AND AWARDS:

- 2014 Brit (1961) & Alex (1949) d'Arbeloff Career Development Professor in the MIT Mechanical Engineering Department
- 2014 Best poster award, Frontiers of Bioengineering Symposium, University of Illinois Urbana-Champaign
- 2011 – 13 Feodor Lynen research fellowship of the Alexander von Humboldt – Foundation
- 2013 Poster award at the Gordon Research Conference on Soft Condensed Matter Physics
- 2011 Salje medal for the best PhD in the Sciences, Clare Hall College, Cambridge, UK (awarded to one PhD graduate in the sciences per year)
- 2011 Dissertation award of the German Physical Society, Section Condensed Matter (2011) (awarded to one or two young scientists per year as acknowledgement for an outstanding scientific thesis and an excellent oral representation thereof)
- 2011 Thesis published in “Springer Theses: Recognizing outstanding PhD research”
- 2010 EPSRC “PhD Plus” Fellowship, Cambridge University, UK
- 2006 – 09 Scholarship of the German Academic Exchange Service, Germany
- 2006 – 09 Scholarship of the Cambridge Isaac Newton Trust, UK
- 2006 – 09 Scholarship of the UK Engineering & Physical Sciences Research Council
- 2009 IOP Poster prize, conference “Liquids and Complex Fluids”, Cambridge, UK
- 2003 & 05 Fellowship of the Franco-German University
- 2000 Goethe medal, best student at the Goethe Gymnasium, Gera, Germany

**PROFESSIONAL SERVICES AND MEMBERSHIPS:** **Reviewer** for Science, Nature Scientific Reports, Proceedings of the National Academy of Sciences, Optics Express, Optics Letters, Advanced Materials, Advanced Optical Materials, Bioinspiration & Biomimetics, Journal of Vacuum Science and Technology, NanoPhotonics, Advanced Functional Materials, Journal of the Royal Society Interface, Physical Review E; **Advisor** on the International Scientific Committee for the Living Light Conference 2016, **Member** of the Materials Research Society, SPIE, American Physical Society, Optical Society of America, German Physical Society, Symposium Organizer for the MRS Fall meeting 2016

## SELECTED PUBLICATIONS:

Journal Papers (>40), Books (1), Book chapter (1), h-index: 18, over 1200 citations

1. L. Li, S. Kolle, J. C. Weaver, C. Ortiz, J. Aizenberg & **M. Kolle**, "A highly conspicuous mineralized composite photonic architecture in the translucent shell of the blue-rayed limpet" *Nature Commun.* 6, 6322 (2015).
2. L. Li, M. J. Connors, **M. Kolle**, G. T. England, D. Speiser, X. Xiang, J. Aizenberg, and C. Ortiz, Multifunctionality of Chiton Biomineralized Armor with an Integrated Visual System, *Science* 350, 952-956 (2015).
3. G. England, **M. Kolle**, P. Kim, M. Khan, P. Munoz, E. Mazur & J. Aizenberg, Bioinspired micrograting arrays mimicking the reverse color diffraction elements evolved by the butterfly *Pierella luna*. *Proc. Nat. Acad. Sci. USA* 111, 15630-15634 (2014).
4. **M. Kolle**, A. Lethbridge, M. Kreysing, J. J. Baumberg, J. Aizenberg, & P. Vukusic, "Bio-inspired band-gap tunable elastic optical multilayer fibres", *Adv. Mater.* 25, 2239-2245 (2013).
5. **M. Kolle** & U. Steiner, "Structural Color in Animals", in *Encyclopedia of Nanotechnology* edited by B. Bhushan, Springer, 2514-2527 (2012).
6. **M. Kolle**, "Photonic Structures Inspired by Nature", *Springer Theses - Recognizing Outstanding PhD Research*, Springer, Berlin, Germany (2011).
7. **M. Kolle**, P. M. Salgard-Cunha, M. R. J. Scherer, F. Huang, P. Vukusic, S. Mahajan, J. J. Baumberg & U. Steiner, "Mimicking the colourful wing scale structure of the *Papilio* butterfly", *Nature Nanotechnology* 5, 511-515 (2010).
8. H. M. Whitney\*, **M. Kolle**\*, P. Andrew, L. Chittka, U. Steiner & B. J. Glover, "Floral iridescence, produced by diffractive optics, acts as a cue for animal pollinators", *Science* 323, 130-133 (2009).

## PATENTS: Pending US Patents (3)

1. **Kolle, M.**, Aizenberg J., Vukusic, P., Howe, R., "Band-gap tunable elastic optical multilayer fibers", Patent pending.
2. Koay, N., Burgess, I. B., Shirman, T., Vogel, N., Phillips, K. **Kolle, M.**, Utech S, Aizenberg J. "Structurally colored materials and methods for making the same", Patent pending.
3. Shirman, T., Vogel N., **Kolle, M.**, Aizenberg, J. "High Surface Area Metal-Coated Structures." Patent pending.

**RECENT INVITED TALKS:** OSA Advanced Photonics 2016, SPIE Smart Structures/NDE 2016, SPIE Photonics West 2016, BioEI 2016 - Internat. Conf. on Bioelectronics, MIT Modern Optics and Spectroscopy Seminar 2015, Opening Lecture at Annual Cambridge Philosophical Society Symposium @ University of Cambridge, UK 2015; Chair for the Japanese-American Frontiers of Science (JAFoS) Symposium, Tokyo, Japan 2014; Materials Research Lecture @ Caltech 2014; ME Seminar Series @ Penn State 2014; Optical Society of America (Rochester chapter) 2014; IEEE-NEMS 2014; Canadian Chemistry Conference 2014;

**MEDIA COVERAGE:** Research featured in four documentaries (*BBC*, *ARTE*) and over 100 print and online media outlets worldwide, including *Nature*, *Science*, *Scientific American*, *The Times*, *Boston Globe*, *The Independent*, *Discovery News*, *CBC News*, *Fox News*, *Die Welt*, ...

1. "Tiny mollusc on beach could hold key to augmented reality", **The Independent**, Feb. 26, 2015.
2. "Iridescent Wings Inspired Counterfeit-Proof Tech", **Discovery News**, Oct. 7, 2014.
3. "Tunable Photonic Fibers Change Color as They Stretch", **Materials360online**, Feb. 4, 2013.
4. "Materials Science: The same, but better" **Nature News & Views**, 496, pp. 40-41, Apr. 3, 2013.
5. "Copying Butterfly Wing Scales Could Fight Forgers", **Scientific American**, June 7, 2010.
6. The strange new world of Nanoscience" (Best Short Film, Scinema Science film festival), 2010.
7. "Butterfly wings have role in tackling fake notes", **BBC**, May 28, 2010.