

INVITED FORM

Nanotech Malaysia 2010: International Conference on Enabling Science and Nanotechnology
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TITLE OF INVITED PAPER: Nanocolours: Correlating Structure with Function

ABSTRACT: Structural colours refer to colours generated by nanostructures, with the characteristic dimension of the structures on the wavelength of the visible light (i.e., some hundreds of nanometers). Structural colouration occurs e.g., in CDs and DVDs, in soap bubbles or oil films on water, in butterfly wings [1] and in the wings of the carpenter bee [2].

The physical fundamentals of structural colours comprise thin-film interference, multilayer interference, diffraction of light and diffraction gratings, photonic crystals and light scattering. No chemical dyes or pigments need to be involved in the generation of the colours – it is all in the structure!

Structural colours do not bleach. They can be functionalized and applied as sensors, e.g. in security, engineering and medicine. Correlation of elaborate natural nanostructures with their optical function inspires novel approaches in man-made structural colours, via biomimetics (i.e., knowledge transfer from biology to technology) [3,4].

- [1] Matin T.R., Menon P.S., Shaari S. and Gebeshuber I.C. (2009) '*Photonic crystal micro- and nanostructures in iridescent butterfly wings*', Proc. Nanotech Malaysia 2009 Conference, KLCC, Kuala Lumpur Convention Centre, Malaysia, October 27-29, 2009, p. 170-171, ISBN: 9789834 492106.
- [2] Gebeshuber I.C., Matin T.R., Menon P.S., Shaari S., Leong M.K. and Majlis B.Y. (2010) '*Correlating nanostructures with function: Structural colours in wings of the Malaysian carpenter bee*', 3rd Nanoscience & Nanotechnology Symposium, June 16, 2010, Bandung, Indonesia, Keynote Presentation.
- [3] Gebeshuber, I.C., Gruber, P. and Drack, M. (2009) '*A gaze into the crystal ball – biomimetics in the year 2059*', Proceedings of the Institution of Mechanical Engineers Part C: Journal of Mechanical Engineering Science, Vol. 223, No. 12, pp. 2899–2918.
- [4] 6. Gebeshuber, I.C. Stachelberger H., Ganji B.A., Fu D.C., Yunas J. and Majlis B.Y. et al. (2009) '*Exploring the innovational potential of biomimetics for novel 3D MEMS*', Advanced Materials Research, Vol. 74, pp. 265–268.

BIOGRAPHY: Prof. Ille C. Gebeshuber is expert in Nanotechnology and Biomimetics. Since 2009 she has been Contract Professor at the Institute of Microengineering and Nanoelectronics of Universiti Kebangsaan Malaysia. Her permanent Professorship is at the Vienna University of Technology where she is habilitated for Experimental Physics. Furthermore, since 2007, she has been Key Researcher at the Austrian Center of Competence for Tribology in Wiener Neustadt, Austria. She is Cofounder of the Vienna-based Center of Excellence for Biomimetics. Prof. Ille C. Gebeshuber is Editor-in-Chief of a new Online Journal on cross-cultural collaboration and a multi-cultural view of engineering (Professional Engineering Publishing, London, UK), Associate Editor of the IMechE Journal of Mechanical Engineering Science (Professional Engineering Publishing, London, UK), Editorial Board Member of various scientific journals and Editor of a book on Biomimetics by Springer Scientific Publishing. She is highly active in Science Outreach. Her research interests comprise Biomimetics of Nanostructures, BioMEMS, Nanomedicine and Tribology. Central aspects of her European-funded BioScreen Project is the analysis of the rich biodiversity in pristine rainforests in South East Asia concerning its biomimetic inspirational potential for technological applications and to install cooperations between institutions in the European Union with local institutions. In the European-funded research project Biornamentics she researches architecture defined by natural patterns. She has just established a new concept for engineering and design-based niche tourism in Malaysia.

Prof. Ille C. Gebeshuber authored more than 40 articles in International Peer Review Journals and presented three Keynote Presentations, 14 Plenary Addresses and 22 Invited Lectures at International Scientific Conferences. Her Public Science activities include 27 Radio Broadcastings and 24 Public Lectures and Workshops. (Status May 14, 2010)

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