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Abstract

Ultrabithorax-based Materials

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Abstract:
Ultrabithorax (Ubx) is a Drosophila melanogaster transcription factor protein the the Bondos group discovered has the ability to form ordered materials in vitro. Ubx monomers are produced in E.coli and, following purification, are suspended in a buffer solution and where they do not aggregate in the volume of the solution when refrigerated. When allowed to rest at room temperature, the monomer self assembles at the air/water interface through nucleation, fibril formation and, eventually, film integration. The the self assembled film can then be pulled into a fibre with diameters in the range of 2–50 μm or lifted off as a film with microscale thickness. These materials are highly elastic and maintain physical properties through cycles of drying and re-hydrating. Novel functions can be directly incorporated into Ubx-based materials via gene fusion to produce chimeric polypeptides capable of both self-assembly and the desired chemical reactivity. Unlike most protein-based materials, the gentle conditions under which Ubx self-assembles enable incorporation of active heterologous proteins. This talk will review recent work on the continued development of this unique materials system including mechanical properties enabled by dityrosine bonding between monomers, dynamics of surface film assembly, and advances in Ubx-based materials production.

Biography:

Kenith Meissner received his PhD from the University of Arizona, Optical Sciences Center in the area of ultrafast spectroscopy and semiconductor physics. He then served

as a Postdoctoral Appointee at Sandia Naitonal Labs. After spending 7 years in industry developing noninvasive blood gluscose technology, Prof. Meissner returned to academia with positions at Virginia Tech (USA), Texsas A&M University (USA) and Swansea University (UK). His research focuses on biomedical optics and micro-/nano-materials.

Recent Publications:

1. Kenith Meissner et al; Novel photomechanical actuators, 2004.
2. Kenith Meissner et al; Adaptive optical system for improved activation of PDT photosensitizers, 2001.
3. Kenith Meissner et al; Cellular automata for the analysis of biomedical hyperspectral images, 2001.
4. Kenith Meissner et al; Virtual reality techniques for the visualization of biomedical imaging data, 2001.
5. Kenith Meissner et al; Non-equilibrium distribution of hot carriers in a CdSe thin film, 1999.

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