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## Hybrid organic-inorganic materials for thin-film lighting technologies

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Hybrid organic-inorganic materials are heralded to head into the next generation of lighting technologies. In this context, our efforts encompass three main actions, namely the development of suitable third-generation of electroluminescent materials for ionic-based lighting devices, the application of nanocarbon-based hybrids in lighting devices and the development of bio-inspired components for lighting, energy conversion and diagnostic applications. Herein, the implementation of the third generation of materials i.e., lighting perovskite nanoparticles, small molecules and copper (I) complexes for light-emitting electrochemical cells (LECs) will be presented as new approaches to develop deep-red, blue and white lighting sources. Finally, a new strategy to stabilize any type of bio-components like enzymes, fluorescent proteins, etc in a rubber-like material will be described. As an example, the latter was applied to fabricate the first bio-inspired hybrid light-emitting diodes featuring a bottom-up energy transfer protein-based cascade coatings. The synergy between the excellent features of fluorescent proteins and the easily processed rubber produces bio-HLEDs with less than 10% loss in luminous efficiency over 100 hours.

### Biography

Ruben D Costa has obtained his PhD on the design of ionic transition-metal complexes for thin-film lighting sources at the Institute of Molecular Science in 2010. From 2011 to 2013, he was a Humboldt Post-doctorate at the University of Erlangen-Nuremberg (FAU) working on nanocarbon-based solar cells. Since 2013, he is Junior Group Leader at the FAU. His current research interest concerns the design of new hybrid materials (organic/inorganic) and their utilization in thin-film optoelectronics in which he is considered as a well-established researcher.

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