New Approaches towards Organic Photodetection and Bio-Integration


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We demonstrate hybrid, solid-liquid photodiodes, using semiconducting conjugated polymers as active materials and ionic liquids as unconventional cathodes (water, saline solutions, physiological buffers, cell-culturing media). We give a complete opto-electronic characterization in photovoltaic regime, investigate the interface phenomena by means of several time-domain optical probes, and propose a physical-chemical explanation of the working principle, taking into account the key-role of the ionic transport. Additionally, we demonstrate that this hybrid device can be an interface for communicating with a neuronal network grown on top of the organic layer. The organic semiconductor behaves as photo-window for unconventional and unprecedented organic-bio communication protocols.