Stimuli-interactive Sensing Display with Self-assembled Polymers

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Development of stimuli-interactive display capable of spontaneously visualizing various external human sensible inputs has been of great interest and tremendous efforts are devoted to the visualization of nonvisible human senses such as touch, smell, taste, and sound. Field induced electroluminescence of either organic or inorganic fluorescent materials under alternating current (AC) has been extensively studied and its unique device architecture in which an emitting layer is separated with an insulator from electrode offers a new platform for designing and developing emerging stimuli-interactive displays. In this presentation, high-performance field-induced AC polymer electroluminescence (AC-PEL) devices are demonstrated with high brightness, high efficiency and color and intensity-tunability [1,2]. We also present a pressure interactive AC display sensor that allows for both sensing and visualisation of pressure. Light emission upon exposure to an AC field between two electrodes is controlled by the capacitance change of the insulator arising from the pressure applied on top. Besides capacitive pressure sensing, our EL sensor allows for direct visualisation of the static and dynamic information of position, shape, and size of a pressurising object on a non-pixelated single device platform. Finally, the presentation shows that simultaneous sensing and visualization of the conductive substance is achieved when the conductive object is coupled with the light emissive material layer on our novel parallel-type AC-PEL device. A variety of conductive materials can be detected regardless of their work functions, and thus information written by a conductive pen is clearly visualized, as is a human fingerprint with natural conductivity [3].

References:
[1] S. H. Cho, C. Park et al. ACS NANO 7, 10809 (2013)
[2] J. H. Lee, C. Park et al. Adv. Funct. Mater. 26, 5391 (2016)
[3] E. H. Kim, C. Park et al. Nat. Comm. 8, 14964 (2017)