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Funding decision

Name	Organisation	Project title	Decision No.	Decision date	Funding period	Funding
Jabbour, Ghassan	OY	Novel Approaches to Printed Organic Light Emitting Field Effect Transistors	133220	29.09.2009	01.01.2010 - 31.12.2013	440 000

Project description
Commercially available rigid display applications involving organic light-emitting (OLEDs) involve the use of c-Si driver circuits to operate properly. Due to processing related costs, these products do not provide the full range of cost savings and versatility expected from organic displays. Further, these substrates cannot be used reliably for flexible displays. This necessitates the development of all-organic driver circuits. However, the very low mobility of organic materials compared to Si makes it desirable to integrate the light emitting devices into the organic thin film transistor based logic circuits. Significant reductions in production costs and design requirements can be achieved if one is to develop reliable organic light emitting transistors (OLET). While research in OLETs is still relatively in its infancy, OLETs are expected to play a crucial role in the development of next generation active matrix organic light emitting display (AMOLED) technology. The resulting simplification of design and the control of the aperture of pixels and charge injection are expected to save costs and enhance reliability and yield. The current hurdles to the adoption of OLETs are mainly: a) Low efficiency: the highest EQE is around 0.8%; b) High power consumption: the drive voltage on present OLETs is as high as 100 V. This is mainly due to the low carrier mobilities of materials, long channel lengths and the materials issue (rarity of ambipolar polymer organic materials) for OLETs; c) High cost: present OLETs employ vacuum deposited inorganic metals as electrodes and photolithography; d) Monochromatic light: Presently, only single component colored OLETs are achievable contrary to the need to have a full RGB range for white colored displays. We propose to develop printed OLETs devices with the following specifications: a) Driving voltages less than 10V; b) External electroluminescent efficiencies in excess of 6% at 200 cd/m2 brightness; c) Flexible substrates; d) CIE (x,y) in (0.3-0.4,0.3-0.4). Our objective is to demonstrate a proof of principle approach. The findings in this work will be the stepping stone for further development of such technology on a roll-to-roll approach in the future. The proposed work presents an excellent educational opportunity for students and postdoctoral fellows to further their knowledge in a highly interdisciplinary area. The concepts learned in this project will contribute tremendously to their preparation as skilled engineering force of the future. Interactions with the many disciplines needed to make this project successful will expose them to physical, chemical, electrical engineering, materials science, and system design principles that are not normally easy to cover in traditional classes taught at the university.