

Final Report Summary
Light Emitting Polymers as Fluorescence Excitation Sources



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This work examines the feasibility of using polymer OLED microdisplays to excite the fluorescent markers used in DNA/RNA studies. The investigation was carried out by two partners, MicroEmissive Displays (MED) Ltd and the University of Edinburgh. Participants from the University included the Institute for Integrated Micro and Nano Systems (IMNS) and the Scottish Centre for Genomics Technology and Informatics. The IMNS and MED are located in the Scottish Microelectronics Centre, West Mains Road, Edinburgh.

MicroEmissive Displays (MED) Ltd is a developer and manufacturer of microdisplays that incorporate light emitting polymer (LEP) materials. Their flagship product is the ME3203 Polymer OLED Colour Microdisplay, which is a highly integrated device that offers high quality QVGA colour images coupled with exceptionally low power consumption. The 7.1mm, 320×240 display has an active silicon backplane manufactured by Taiwan's UMC in 0.3 μ m CMOS, a layer of white-emitting LEP pixels, and an RGB colour filter layer.

In this study, a ME3203 microdisplay was used, in combination with the MED development kit, as an excitation source for a standard fluorescent marker employed in DNA and RNA microarray assays. At present, these microarrays are analysed using bulky excitation sources, optics and detectors that do not lend themselves to miniaturization. However, there is growing interest in the study of next generation devices that incorporate microarray technology with microelectronic circuitry to enable the controlled interrogation of individual probes within an array. An important goal in this research is to develop a simple on-chip light source than can be employed to excite the fluorophores involved in these assays. It is this aim that led MED and the IMNS to initiate this research programme.

Conclusion

Using the ME3203 microdisplays we have been able to excite samples of fluorescein, a standard fluorescent marker used in a variety of biological studies. The emission spectra of a range of dilutions of the fluorescein marker have been measured and the linearity of the response assessed. Despite the limitation that the devices in their present form have not been optimised for the requirements of this research, the P-OLED microdisplay technology shows significant promise for the application. Further R&D is required in order to begin to realize that potential.

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