

A flexible, transparent plastic foil showing an array of organic transistors, inkjet printed wires, and an e-ink display. Photo courtesy of CIKC

# Functional Integrated Plastic Systems

Antony Sou  
University of Cambridge  
20<sup>th</sup> March 2014



**PLASTIC LOGIC**

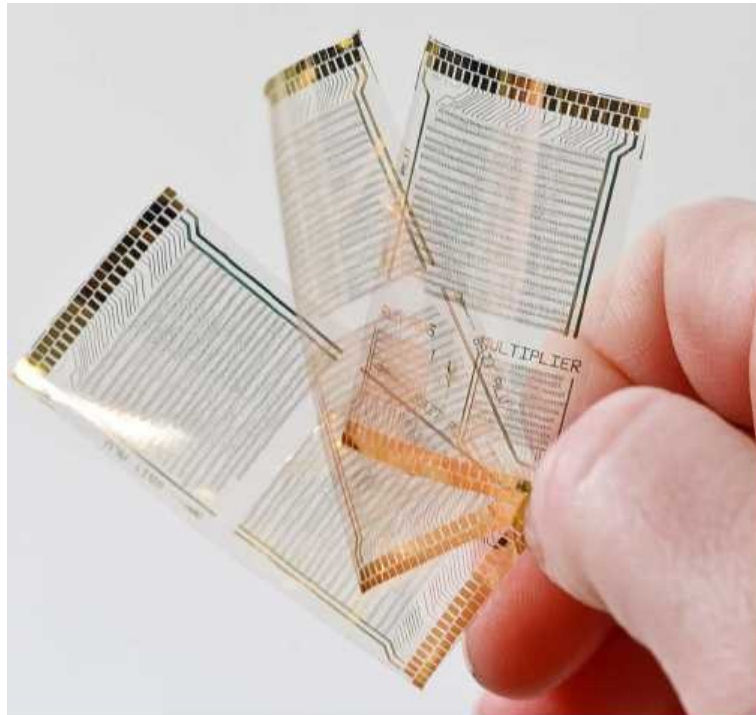
**CIKC** CAMBRIDGE INNOVATION  
AND KNOWLEDGE CENTRE

Advanced Manufacturing Technologies for Photonics and Electronics

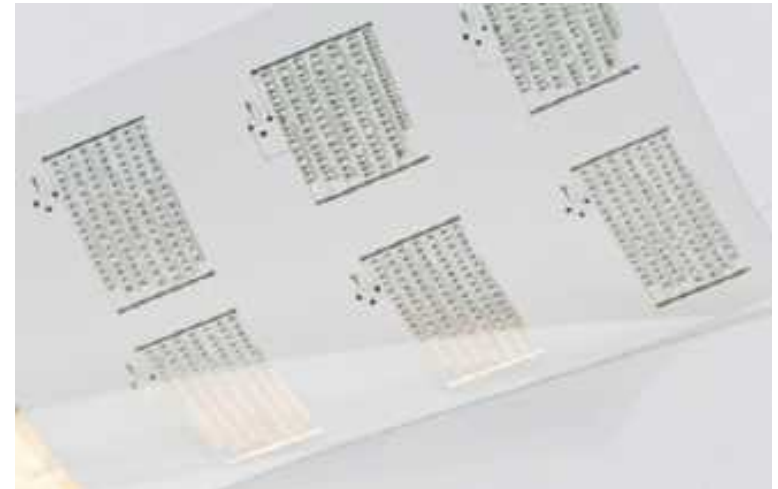
# Outline

- Large scale integration with organic transistors
- Process technology & inkjet printed functional components
- Integration of transistors, printed components, displays

# Large Scale Integration of Organic Transistors



8-bit microprocessor <sup>1</sup>



8-bit RFID transponder <sup>2</sup>

# Process & Printing

# Ink-Jet Printed Ag Inverter Chain

# Inverters Chain Before & After Substrate Release

# 7-stage Ring Oscillator

(344 printed lines, frequency option, enable operation)

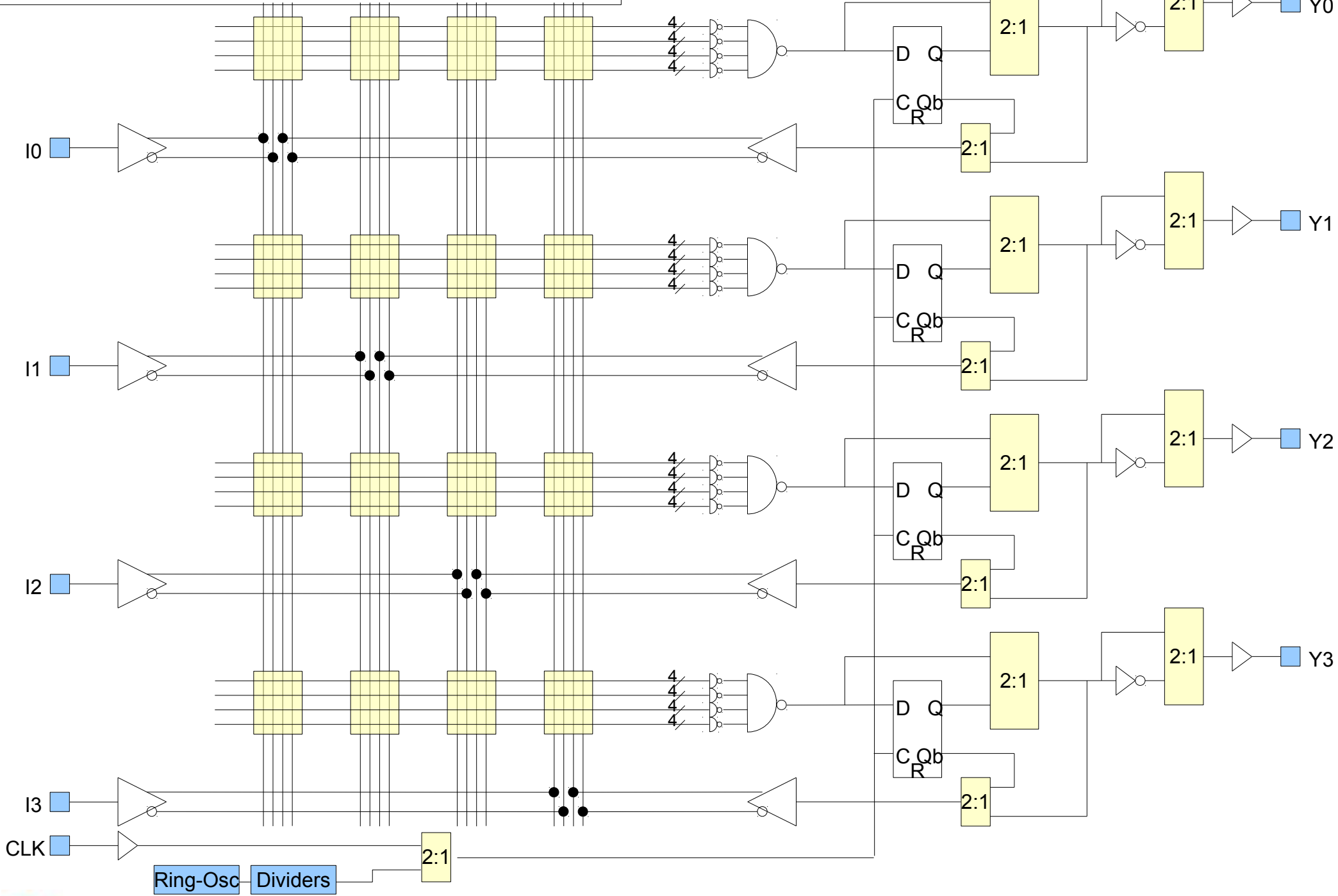
# Printed Resistors with Logic (1)



# Printed Resistors with logic (2)

Flexible  
desktop  
demonstrators  
with logic,  
display &  
batteries in air

# Programmable Logic Array Structure



# **The first demonstration of a fully flexible display completely driven by OTFT logic without the need to use silicon**

# Summary

- First demonstration of organic transistors and printed electronics driving a display integrated onto a single flexible plastic substrate
- First demonstration of an organic transistor programmable logic array programmed by printed electronics on a flexible plastic substrate

# Acknowledgements

- University of Cambridge

Henning Sirringhaus, Sungjune Jung, Enrico Gili

- **PLASTIC LOGIC**

Jerome Joimel, Guillaume Fichet, Liz Speechley,  
Srinivasan Madabhushi, Shane Norval

**CIKC** CAMBRIDGE INNOVATION  
AND KNOWLEDGE CENTRE

Advanced Manufacturing Technologies for Photonics and Electronics