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**All-Printed Low Voltage Operation Polymer Transistors and Circuits Based on Ion Gel Gate Dielectrics** YU XIA, JEONG HO CHO, MINGJING HA, Department of Chemical Engineering and Materials Science, University of Minnesota, MICHAEL RENN, Optomec, Inc, C. FRISBIE, Department of Chemical Engineering and Materials Science, University of Minnesota, OPTOMECC, INC COLLABORATION — A key challenge in the development of organic electronics lies in the realization of high quality devices with low cost. In this presentation, we demonstrate high performance polymer transistors and circuits with all components fabricated by a commercial aerosol jet printing technique. Printing saves the device manufacturing cost through its simple procedure, fast speed, high throughput and low waste of materials. Furthermore, by employing a specially designed ion gel as the gate dielectric material, ultra-high density carrier accumulation ( $> 10^{14} \text{ cm}^{-2}$ ) can be achieved in the transistor channel, which results in an exceptionally large transconductance of  $10 \mu\text{S}/\mu\text{m}$ . Our typical transistors have mobility higher than  $1\text{cm}^2/\text{Vs}$  and frequency response up to 10 kHz. Inverters, NAND and NOR logic circuits and ring oscillators have been realized as well, with low operation voltage, fast speed and high gain. In addition, the high polarizability of the gate dielectric allows us to print the gate electrode of each single transistor along with its source and drain electrodes at the same time in a coplanar architecture, which significantly simplifies the fabrication procedure.

Yu Xia  
University of Minnesota

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