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Water-Dispersible Polyaniline Electrodes for Thin-Film Transistors KWANGSEOK LEE, YUEH-LIN LOO, Chemical Engineering, University of Texas at Austin, GRACIELA BLANCHET, FENG GAO, DuPont Central Research — We report a technique for directly patterning water-dispersible conductive polyaniline by a "stamp-and-spin-cast" method. This patterning scheme relies on the creation of hydrophilic and hydrophobic regions on an insulating substrate, and then spin-casting an aqueous dispersion of conductive polyaniline on the treated substrate. Since polyaniline selectively adsorbs in the hydrophilic regions, conductive features as small as 5 microns result immediately after spin-casting. We have fabricated polyaniline source and drain electrodes for organic thin-film transistors using this technique. Characterization reveals that polyaniline electrodes and contacts are functionally as effective as gold electrodes; saturation mobilities upwards of 0.1 cm^2/V.sec and on/off rations of order 10^4 – typical of pentacene transistors with gold electrodes – can be routinely achieved with polyaniline electrodes. Electrical characterization in the low source-drain voltage regime, however, reveals some subtleties. Specifically, the "hooking behavior" – attributed to large contact resistance at the organic semiconductor-metal interface – typically observed in organic transistors with gold electrodes is absent in polyaniline devices. This observation suggests a smaller contact resistance in transistors with polyaniline electrodes.

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