Contact engineering in organic thin film transistors

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In active displays, TFTs work in the linear regime for most of the time. For emerging organic TFTs which have potentials to drive cheap and flexible display, operations in linear regime usually highly suffered from contact resistance.[1] We reviewed our efforts in contact engineering in OTFTs. Firstly, we proposed a series of analytical tool to fast identify the contact injection problems, including measuring simple current-voltage characteristics and more complicated noise measurements.[2] Then we investigated the problem of widely used thermal evaporated metal contacts, and found the thermal damage including diffusion and destruction are the roots of poor contacts.[3] Accordingly, we proposed adequate parameters and alternative fabrication processes in electrode fabrication.[4] Thirdly, we developed several materials for charge injection layers, including metal oxides, salts and nanoparticles that are all solution-processed.[5] Fourthly, we also probed the bulk injection processes which are sensitively affected by defects and traps, and developed doping method to reduce resistance in bulk injection.[6] By these materials engineering, we have lowered contact resistance up to several tens of times, achieved several times of higher mobility for TFTs with many organic semiconductors, and would hopefully benefit general OTFTs.

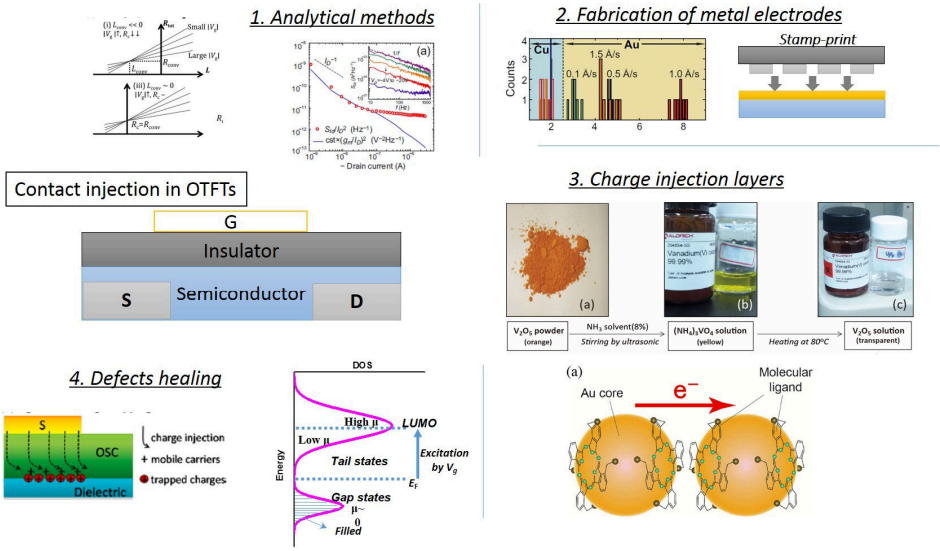

Fig. 1. Contact engineering for OTFTs.

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