Vapour-deposited high-performance tin halide perovskite transistors

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Solution-processed tin (Sn^{2+}) -halide perovskites can be used to create p-channel thin-film transistors (TFTs) with performance levels comparable with commercial low-temperature polysilicon technology.^[1-3] However, high-quality perovskite film deposition using industry-compatible production techniques remains challenging. Here we report the fabrication of p-channel Sn²⁺-halide perovskite TFTs using a thermal evaporation approach with inorganic caesium tin iodide (CsSnI₃).^[4] We use lead chloride (PbCl₂) as a reaction initiator that triggers solid-state reactions of the as-evaporated perovskite compounds. This promotes the conversion of dense and uniform perovskite films, and also modulates the intrinsically high hole density of the CsSnI₃ perovskite channels. Our optimized TFTs exhibit average hole field-effect mobilities of around 33.8 cm² V⁻¹ s⁻¹, on/off current ratios of around 10⁸, and large-area fabrication uniformity. The devices also exhibit improved stability compared with solution-deposited devices.



Fig. 1. Electrical characterisations of vapour-deposited CsSnI₃-based TFTs.

References

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