
Oral Presentation

[FLX3]Printed TFT Technologies

Chair: Hiroki Meada (Dai Nippon Printing Co., Ltd.)

Co-Chair: Takashi Nagase (Osaka Prefecture University)

Fri. Nov 29, 2019 9:00 AM - 10:15 AM Room 107 (1F)

9:50 AM - 10:15 AM

[FLX3-3(Invited)]Development of High Performance Semiconductor Inks for Printed Field-Effect Transistors For Flexible Display

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Keywords:perovskite, carbon nanotube, thin film transistors

Although organic-inorganic halide perovskites continue to generate considerable interest with the high potential to be widely applied in a variety of optoelectronic devices, there are some critical obstacles to practical applications such as the toxicity of lead, the relatively low field effect mobility and the strong hysteresis during operation. Here we develop a universal approach to significantly improve mobility and operational stability, and reduce the hysteresis of perovskite-based transistors simultaneously through coupling low-dimensional lead-free perovskite material ($(\text{C}_6\text{H}_5\text{C}_2\text{H}_4\text{NH}_3)_2\text{SnI}_4$ (hereafter abbreviated as $(\text{PEA})_2\text{SnI}_4$) with embedded conjugated polymers wrapped semiconducting carbon nanotubes (semi-CNTs). In the $(\text{PEA})_2\text{SnI}_4$ /semi-CNTs hybrid systems, semi-CNTs can contribute as smooth tracks for carriers to transport with less scattering and trapping of perovskite grain boundaries. We also demonstrate the extraordinary performance of $(\text{PEA})_2\text{SnI}_4$ /semi-CNTs hybrid phototransistors with ultrahigh photoresponsivity and photosensitivity, which is found to be on a par with the best devices available to date.