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14154

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Available Technologies

OLED Deposition Technology

SUMMARY

Low-cost processing methods will be required if the small organic molecule materials currently under development for use in organic light-emitting devices (OLEDs) and other electronics are ever to realize wide-spread commercial application.

Researchers at PNNL have developed a deposition method for such materials that is specifically suited to wide-area, roll-to-roll processing. The method involves injecting a mixture of a non-polymeric organic compound with a fluid carrier into a "hot box" that converts the mixture to the gas phase. The gaseous mixture is then sprayed on a substrate, such as a polymeric substrate mounted in a vacuum web coater, that is kept at a temperature such that the non-polymeric organic compound condenses on the substrate, while the fluid carrier does not condense on the substrate and thus, can be captured for subsequent reuse.

Use of a fluid transport mechanism allows for extremely high thin-film deposition rates. Using this process, a thin-film layer of a small molecule organic compound can be efficiently and rapidly deposited on a wide area substrate. Proof-of-principle of the technique has been demonstrated by successfully coating the small molecule Alq₃ on a PET substrate. The method may also be used to produce "patterned" electronic thin-film devices in which an active small molecule organic material is selectively deposited on a substrate to form a pattern appropriate for the operation of the device.



U.S. DEPARTMENT OF
ENERGY

Patents & Intellectual Property

- » Patent #: 7,592,043

Technology Portfolio(s)

- » Electronics
- » Materials Forming, Joining and Deposition

Potential Industry Applications

- » Chemicals
- » Computers & Electronics
- » Energy & Utilities

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