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Fully transparent thin-film transistors based on aligned single-walled carbon nanotube arrays

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**Fully transparent thin-film transistors based on aligned single-walled carbon nanotube arrays**

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**Introduction**

The work describes the first demonstration of fully transparent thin-film transistors (TFTs) based on well-aligned single-walled carbon nanotube (SWNT) arrays with indium tin oxide (ITO) source/drain/gate electrodes. The fully transparent SWNT-TFTs could be attractive candidates for future flexible/ or transparent electronics. The transistors provide suitable current levels to drive OLED pixels (e.g. for high resolution displays), and operated at relatively low gate biases (~2V). The use of aligned SWNTs allows scaling of the current levels with device width, which will be important for future circuit approaches.

We propose several new approaches to overcome the limitations of conventional carbon nanotube transistors.

1. Difficulty in the separation of semiconducting and metallic SWNTs
2. Alignment of the nanotubes to device in a controlled fashion
3. High yield devices isolated from their environment

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**Interface study of SWNT-FETs (1/f noise)**

The process of electrical breakdown

**IV characteristics of depletion mode SWNT-TFTs**

Optical transmission spectra

Proposed approach for realization of transparent electronics