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## SYNTHESIS AND CHARACTERIZATION OF TRANSPARENT FLEXIBLE CONDUCTING LAYER

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### ABSTRACT

In recent, scientists in global are trying to fabricate low cost transparent and flexible devices. To make a transparent flexible device, not only the substrate but the entire layers (like transparent conducting thin layer, active layer and contacts) should be transparent and flexible. Flexible substrates include polymer substrate, metal foil and thin glass. Metal foils are not transparent while glass is transparent and it has the ultimate barrier properties and resistant to process temperature and chemicals, but it lacks the flexibility. Polymeric substrates are suitable alternative. But polymer substrates arguably face the greatest challenges in terms of compatibility with all of the other necessary layers that need to be integrated onto them. As the substrate is organic, all the process should be low temperature process. We, in this paper will describe flexible transparent conducting layer with CNT fabricated by spray methods.

The interests on the flexible transparent conducting films (TCFs) have been growing recently due to its tremendous potential application for flexible wearable displays. In the conventional technology indium-tin oxide (ITO) is used for TCFs which are usually of low resistance with high transmittance. But it suffers from poor flexibility factor. This is a serious drawback for commercialization of low cost flexible display. Alternatively, carbon nanotube (CNT) is a new functional material that can be treated as graphitic sheets with a hexagonal lattice being wrapped up into a cylinder.

It is generally known that CNTs have high elastic modulus of 1–2 TPa with high electrical conductivity which is 1000 times larger than Cu-wires[1]. CNTs are capable of forming naturally robust random network in the film and provide low sheet resistance and high transmittance with a minimal amount. CNT films have been known to exhibit an excellent bending characteristic over the conventional ITO film [2]. Although CNTs have been suggested for flexible TCFs with outstanding film performance but it strongly depends on the film preparation conditions. The understanding for the film fabrication methods, material dependence, and criteria to determine the sheet resistance and transmittance is still in its infant stage.

Generally Polymeric substrates are the suitable choice as a transparent flexible substrate [3]. But the problem with polymer structure is that its compatibility with other necessary layers. The process required to be low temperature as the substrate is organic. In this paper we will describe transparent conducting layer with CNT by spray methods using two different solution and study the effect of them on conductivity and transparency.

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