

**Non-Confidential Description - PSU No. PSSHE-1  
"Solution-Based Process for Deposition of Cathodes for LEDs" \***

**Keywords:**

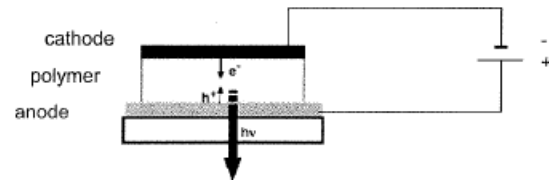
polymer light emitting device, optoelectronic device, cathode deposition, LED

**Links:**

[Inventor website](#)

**Inventors:**

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**Fig 1: Schematic of a typical polymer light emitting device.**

**Background**

Polymer light-emitting devices (LEDs), such as those found in television screens, computer monitors, mobile phones, and outdoor advertising, consist of three essential layers: a cathode, an anode, and a light-emitting layer. This layer consists of a polymer which, when proper electrical charges are injected by the electrodes, illuminates. Since 1990 many different polymers have exhibited such electroluminescence; many researchers have looked to improve the efficiency, cost, and lifespan of these polymers. However, the process for producing LEDs – regardless of the polymer used – has largely remained unchanged. The current process requires a vacuum system and thermal evaporation, adding time, cost, and complexity to the procedure. A more elegant solution would eliminate the need for an expensive vacuum system and do away with time-consuming thermal evaporation.

**Invention Description**

The object of this invention is a solid state polymer light-emitting device which is completely fabricated using solution-based processes, eliminating the need for vacuum deposition, e.g. thermal evaporation. The cathode is deposited by electroless deposition from aqueous solution. This results in significant simplification of the process, reducing the time for device preparation and lowering the associated cost. This is expected to facilitate and hasten the mass production of large area light emitting devices, where current production is cost-prohibitive. This invention can be utilized in diverse industrial processes for the production of displays, billboards, illumination units, among other possible applications.

**Advantages/Applications**

- Reduced preparation time for device structures, at a lower cost
- Consumes less material and energy
- Less capital equipment necessary, with lower maintenance costs
- Completely fabricated using solution-based processes: no vacuum deposition

\*Note: This invention was created at and is owned by Lock Haven University. It is managed by Penn State under agreement.

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