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Solution-processed metal nanowire mesh transparent electrode for large-area electronics

A team of Stanford engineers have developed a low-cost, solution-processed method to fabricate a flexible nanowire mesh that can be used in transparent electrodes, as a replacement for metal oxides (such as ITO, indium tin oxide). This fabrication technique is carried out at moderate temperatures which are gentler to the underlying layers than sputtering. In addition, the resulting films are more conductive than ITO for the same transparency, resulting in solar cells that outperform devices based on ITO. Other applications for the nanowire mesh include large area electronics such as flat panel displays and light-emitting devices.

Applications

- **Transparent electrodes** (ITO replacement) for:
  - solar cells
  - flat panel displays
  - light emitting devices

Advantages

- **Flexible material** - nanowire mesh is not brittle and can be used on flexible substrates without cracking
- **High performance** - more transparent for a given sheet resistance, which leads to better devices
- **Low cost process** - solution casting and a moderate temperature (200^{o}C) anneal

- **Gentle** - this process causes less damage to underlying active organic layers compared to sputtering of ITO

Publications

- J.-Y. Lee, S.T. Connor, Y. Cui, P. Peumans, "Solution-processed metal nanowire mesh transparent electrodes", *Nanoletters* 2008.

Patents

- Published Application: 20100178417
- Published Application: 20130098436

Innovators

- Jung-Yong Lee
- Peter Peumans
- Yi Cui
- Steve Connor

Licensing Contact

Jon Gortat

Licensing & Strategic Alliances Director for Physical Science

Email