Applications of inorganic nanomaterials for printed electronics

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Abstract

Nanotechnology has been the most pursued science and technology topic worldwide in the last two decades. If one recounts the successful stories in nanotechnology development, it would undoubtedly be the development of variety of nanomaterials. Many forms of nanomaterials have been discovered. However, most of the reports of nanomaterials are scientific publications. The successful stories of industrial scale applications of nanomaterials are rare and scattered. One challenge is to find efficient and low cost ways to integrate nanomaterials into a device or a system. Recent rapid development of printed electronics offers hopes for industrial scale application of nanomaterials, as most of nanomaterials can be formulated as inks and printed.

The Printable Electronics Research Centre (PERC) has been developing various electronic applications based on printing inorganic nanomaterials in the last 8 years. The applications ranged from solar cells, thin-film transistors, to flexible and stretchable electronic circuits. One successful story is the development of a novel hybrid printing process for making metal-mesh transparent conductive films (Figure 1). The technology has been industrialized for making touch panels in high volume. Notebook computers using the metal-mesh touch panels have been commercialized. Other applications include printed flexible hybrid electronics. Wearable temperature patch which can transmit body temperature wirelessly to a mobile phone has been developed (Figure 2).

Image



Figure 1

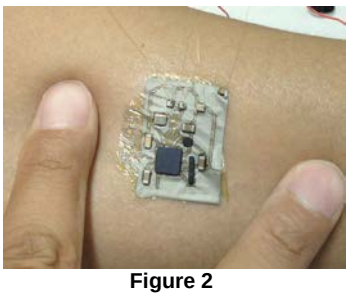


Figure 2

Recent Publications (minimum 5)

1. Z. Cui, et al, Printed Electronics: Materials, Technologies and Applications, Wiley, 2016
2. X. Chen, WM. Su, Z. Cui, Embedded Ag/Ni Metal-Mesh with Low Surface Roughness As Transparent Conductive Electrode for Optoelectronic Applications", ACS Appl. Mater. Interfaces 2017, 9, 37048-37054
3. X. Zhang, JW. Zhao, Z. Cui, "Flexible CMOS-Like Circuits Based on Printed P-Type and N-Type Carbon Nanotube Thin-Film Transistors", Small, 2016, 12(36), 5066-5073
4. M. Xie, Z. Chen, Z. Cui, "Performance improvement for printed indium gallium zinc oxide thin-film transistors with a preheating process", RSC Advances, 2016, 6, 41439
5. H. Lu, J. Lin, CQ. Ma, Z. Cui," Inkjet printed silver nanowire network as top electrode for semi-transparent organic photovoltaic devices", Appl. Phys. Lett. 2015，106, 093302



Biography (150 word limit)

Professor Zheng Cui had worked in the UK for 20 years from 1989 to 2009, first at Cambridge University and then at Rutherford Appleton Laboratory as a Principal Scientist and group leader. He returned to China in October 2009 and joined the Suzhou Institute of Nanotech and Nanobionics where he setup the first research center in China dedicated to printed electronics R&D. He and his research team have developed a wide range of printed electronics technologies and some have been transferred to industry and commercialized. Since 2010, he has authored and coauthored over 50 scientific journal publications, 4 books and 60 patents. He has been a Fellow of UK Institution of Engineering and Technology (IET) since 2004..

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Notes/Comments: