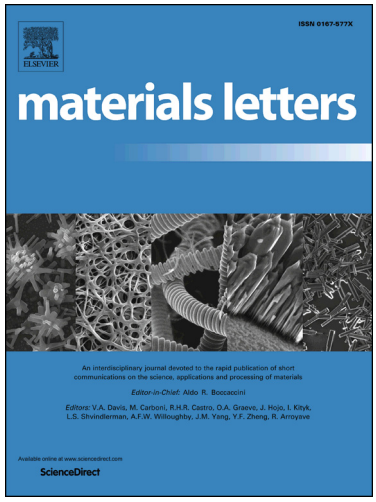

Nature-Inspired Bilayer Metal Mesh for Transparent Conducting Electrode Application

Neha Sepat, Vikas Sharma, Devendra Singh, Garima Makhija, Kanupriya Sachdev

PII: S0167-577X(18)31292-8
DOI: https://doi.org/10.1016/j.matlet.2018.08.088
Reference: MLBLUE 24799

To appear in: *Materials Letters*

Received Date: 12 July 2018
Revised Date: 13 August 2018
Accepted Date: 16 August 2018

Please cite this article as: N. Sepat, V. Sharma, D. Singh, G. Makhija, K. Sachdev, Nature-Inspired Bilayer Metal Mesh for Transparent Conducting Electrode Application, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.08.088

Nature-Inspired Bilayer Metal Mesh for Transparent Conducting Electrode Application

Neha Sepat[1], Vikas Sharma[1, 3,*], Devendra Singh[1], Garima Makhija[1], Kanupriya Sachdev[1, 2,*]

[1] *Department of Physics, Malaviya National Institute of Technology, Jaipur, 302017, India*
[2] *Materials Research Centre, Malaviya National Institute of Technology, Jaipur, 302017, India*
[3]*Department of Physics, Indian Institute of Technology Delhi, New Delhi, 110016, India*

** Email: phyvikas@gmail.com, ksachdev.phy@mnit.ac.in*

Nature-inspired structures as transparent conducting electrodes are exciting alternatives to conventional TCEs because they provide higher transmittance and conductivity at low temperatures on flexible substrates. The current work is focussed to develop a metal mesh structure with the help of plant leaf vein as a template. Bilayer metal mesh of thickness < 100 nanometer was deposited and transferred to flexible plastic substrate at room temperature. Scanning electron microscopy images were used to obtain the ratio of open area space and covered space of the electrodes. The bilayer metal mesh structure shows high optical transmittance (>85%) and electrical resistivity of the order of 10^{-4} Ω cm. The metal mesh TCE based on leaf vein template opens up new ways of obtaining large charge transfer resolving the junction resistance problem encountered in case of metal nanowires.

KEYWORDS: Transparent Conducting Electrodes (TCEs); Bilayer Metal Mesh; Electrical properties; XPS.

Introduction

The primary requirement for TCEs is that it should allow transport of both electrons and photons [1]. Flexibility, long-term stability, non-toxicity and cost-effective processing are other important requirements depending on different applications [2]. The transparent conducting electrode is a crucial component for optoelectronic devices such as liquid-crystal displays, touch screens, OLEDs, photovoltaic [3]. Over the last decade a persistent increase in optoelectronic