Accepted Manuscript

Effect of supersonic spraying impact velocity on opto-electric properties of transparent conducting flexible films consisting of silver nanowire, ITO, and polyimide multilayers

Tae-Gun Kim, Jong-Gun Lee, Chan-Woo Park, Hong-Seok Jo, Min-Woo Kim, Maikel F.A.M. van Hest, Dae-Hyung Cho, Yong-Duck Chung, Sam S. Yoon

PII: S0925-8388(17)34433-X

DOI: 10.1016/j.jallcom.2017.12.237

Reference: JALCOM 44323

To appear in: *Journal of Alloys and Compounds*

Received Date: 16 October 2017

Revised Date: 13 December 2017

Accepted Date: 22 December 2017

Please cite this article as: T.-G. Kim, J.-G. Lee, C.-W. Park, H.-S. Jo, M.-W. Kim, M.F.A.M. van Hest, D.-H. Cho, Y.-D. Chung, S.S. Yoon, Effect of supersonic spraying impact velocity on opto-electric properties of transparent conducting flexible films consisting of silver nanowire, ITO, and polyimide multilayers, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2017.12.237.

Effect of Supersonic Spraying Impact Velocity on Opto-electric Properties of Transparent Conducting Flexible Films Consisting of Silver Nanowire, ITO, and Polyimide Multilayers

Tae-Gun Kim[a,†], Jong-Gun Lee[a,†], Chan-Woo Park[a], Hong-Seok Jo[a], Min-Woo Kim[a], Maikel F.A.M. van Hest[b], Dae-Hyung Cho[c], Yong-Duck Chung[c,*], Sam S. Yoon[a,*]

[a]School of Mechanical Engineering, Korea University, Seoul 02841, Republic of Korea
[b]National Renewable Energy Laboratory, Golden, CO 80401, USA
[c]Electronics and Telecommunications Research Institute (ETRI), 218 Gajeong-ro, Yuseong-gu, Daejeon, 34129, Korea

Abstract:

We demonstrate the use of supersonic spraying for the deposition of silver nanowires (AgNWs) on a flexible polyimide (PI) substrate for the formation of transparent and conducting films (TCF) as an alternative to nonflexible ITO (indium tin oxide). The self-fused intersections of the NWs resulted in films with a low sheet resistance (R_s = 31 Ω/sq) and fairly high transmittance (Tr = 92%) on a glass substrate. The effect of the impact speed of the supersonically sprayed AgNWs on the opto-electric properties of the flexible TCF was evaluated by varying the spray coating conditions. The fabricated films were characterized by X-ray diffraction analysis, atomic force microscopy, ultraviolet-visible spectroscopy, and scanning electron microscopy. Finally, cyclic bending tests were performed on the PI/AgNW films as well as PI/ZnO/indium tin oxide/AgNW films, and the changes in their electrical properties with bending were compared.

Keywords: Supersonic spray; Self-fusion; Silver nanowires, Transparent conducting film; Flexible substrate

[†]These authors have contributed equally.

***Corresponding authors:** ydchung@etri.re.kr, skyoon@korea.ac.kr