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Ahiud Morag, Raz Jelinek

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“Bottom-up” transparent electrodes

Ahiud Morag and Raz Jelinek*

Department of Chemistry and Ilse Katz Institute for Nanoscale Science and Technology,

Ben Gurion University of the Negev, Beer Sheva 84105, Israel

* razj@bgu.ac.il

Abstract

Transparent electrodes (TEs) have attracted significant scientific, technological, and commercial interest in recent years due to the broad and growing use of such devices in electro-optics, consumer products (touch-screens for example), solar cells, and others. Currently, almost all commercial TEs are fabricated through “top-down” approaches (primarily *lithography-based* techniques), with indium tin oxide (ITO) as the most common material employed. Several problems are encountered, however, in this field, including the cost and complexity of TE production using top-down technologies, the limited structural flexibility, high-cost of indium, and brittle nature and low transparency in the far-IR spectral region of ITO. Alternative routes based upon *bottom-up* processes, have recently emerged as viable alternatives for production of TEs. Bottom up technologies are based upon self-assembly of building blocks - atoms, molecules, or nanoparticles – generating thin patterned films that exhibit both electrical conductivity and optical transparency. In this Feature Article we discuss the recent progress in this active and exciting field, including bottom-up TE systems produced from carbon

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