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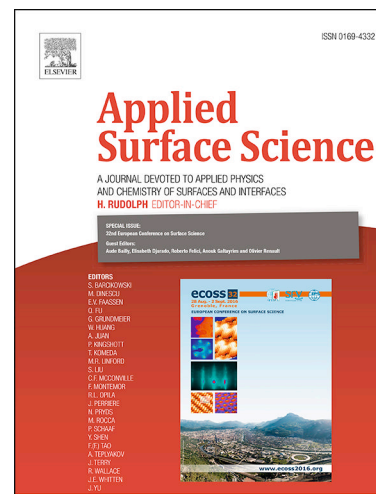
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## Hierarchical functionalization of electrospun fibers by electrodeposition of zinc oxide nanostructures

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### Abstract

Electrospun sub-micrometer polymer fiber mats represent an interesting substrate which can be employed as a transparent conducting electrode. Functionalization by using nanostructures represent a convenient way of increasing the range of applications. The present paper describes an electrodeposition process which can be applied for preparing ZnO nanostructures covered fibers in a straightforward manner. Poly(methyl methacrylate) fiber mats were prepared by electrospinning using metal frame collectors. Subsequent metallization by DC sputtering was used, these microstructured electrodes being thermally transferred onto glass substrates and further employed as working electrodes for the electrochemical deposition of ZnO. The transparency of the metal covered webs, a function of fiber density, is comparable to that of conventional transparent conductive oxides electrodes such as ITO. The same enhanced control of the ZnO electrodeposition process was observed for the case of the web electrodes as for the classic case of deposition on transparent conducting oxides or on metallic substrates. Structural, optical, morphological and wetting properties were investigated and correlated with the electrodeposition conditions. The photocatalytic properties of ZnO covered fibers were tested through the decomposition of methylene blue thin films under UV irradiation.

**Keywords:** electrospinning, ZnO, electrodeposition, transparent electrodes, photocatalytic activity

### 1. Introduction

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