

# Accepted Manuscript

Plasmonic polyaniline/gold nanorods hybrid composites for selective NIR photodetection: Synthesis and characterization

Gaser N. Abdelrasoul, Francesca Pignatelli, Ioannis Liakos, Roberto Cingolani, Athanassia Athanassiou



PII: S1359-8368(18)30651-6

DOI: [10.1016/j.compositesb.2018.05.015](https://doi.org/10.1016/j.compositesb.2018.05.015)

Reference: JCOMB 5685

To appear in: *Composites Part B*

Received Date: 28 February 2018

Revised Date: 28 April 2018

Accepted Date: 9 May 2018

Please cite this article as: Abdelrasoul GN, Pignatelli F, Liakos I, Cingolani R, Athanassiou A, Plasmonic polyaniline/gold nanorods hybrid composites for selective NIR photodetection: Synthesis and characterization, *Composites Part B* (2018), doi: [10.1016/j.compositesb.2018.05.015](https://doi.org/10.1016/j.compositesb.2018.05.015).

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Plasmonic Polyaniline/Gold Nanorods Hybrid Composites for selective NIR photodetection: synthesis and characterization

Gaser N. Abdelrasoul<sup>1,2\*</sup>, Francesca Pignatelli<sup>1</sup>, Ioannis Liakos<sup>3</sup>, Roberto Cingolani<sup>1</sup>, Athanassia Athanassiou<sup>1</sup>

1. Smart Materials, Department of Nanophysics, Istituto Italiano di Tecnologia, via Morego 30, 16163 Genova, Italy.
2. Forensic Sciences and Medicolegal Authority, Cairo, Egypt.
3. Center for Micro-BioRobotics, Istituto Italiano Di Tecnologia, Via Morego 30, 16163 Genova, Italy.

### Abstract:

Abstract scheme

In this study, we present the development of polyaniline/gold nanorod nanocomposites and the effect of the nanorods' aspect ratio and concentration on the overall electrical conductivity of nanocomposite systems. The electrical characterization showed that at the same atomic gold concentration, the conductivity of the nanocomposites increased by about 14 % after increasing the gold nanorods' aspect ratio from 2.9 to 3.8. Furthermore, the conductivity of the nanocomposites increases linearly with the concentration of atomic gold, keeping the nanorods' aspect ratio stable, due to increasing the metallic content. The interaction between polyaniline and gold nanorods was investigated by FTIR, micro Raman, and XPS spectroscopic techniques, indicating the delocalization of the charges across the polymer chains induced by the incorporation of the nanorods. The interaction most likely occurs through the imine nitrogen of the polymer's backbone. The homogenous distribution of the gold nanorods in the polyaniline matrix was verified by TEM. Furthermore, the selective photosensitivity of the developed nanocomposites to NIR light was examined, and an increase in their current density was detected when the nanocomposites were irradiated at the wavelength that coincides with the longitudinal plasmonic resonance absorption of the incorporated nanorods. We foresee applications of the developed nanocomposites in numerous optoelectronic sectors.

**Keywords:** Polyaniline – Gold nanorods – Nanocomposites – Photodetectors – Polyaniline/gold nanorods composites.

### Introduction

Polymeric nanocomposites have attracted considerable attention for applications in many technological areas, since they combine the lightweight, low cost and processability of polymeric materials with the characteristic properties of the embedded inorganic nanoparticles, e.g. conductivity or sensitivity to external stimuli, etc. The interaction between the nanocomposite components can be either physical or chemical depending on the surface nature of the nanoparticles and the presence of functional groups on the polymer chain. Among the various developed nanocomposite systems, the ones used most extensively in the field of flexible optoelectronics are the conductive polymer/metallic nanoparticle composites, due to the charge transfer processes occurring at the interface of the nanoparticles with the matrix.

Download English Version:

<https://daneshyari.com/en/article/7211889>

Download Persian Version:

<https://daneshyari.com/article/7211889>

[Daneshyari.com](https://daneshyari.com)