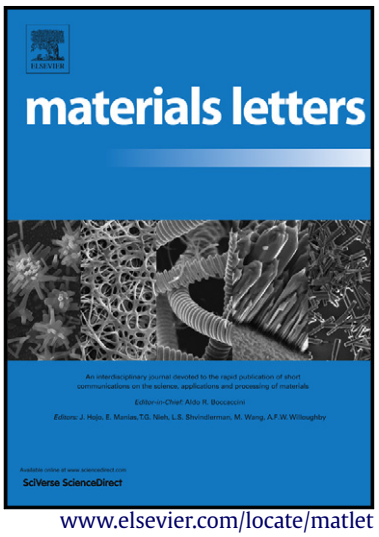

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One pot green synthesis of gold nanowires using pomegranate juice

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Abstract

Plasmonic gold nanoparticles with diverse morphology have unique properties that lend themselves to unusual optical applications, potentially including use as absorption amplifiers in thin film solar cells. Gold nanowires (NWs) were successfully synthesized with a green, one pot, surfactant free and room temperature method. Pomegranate juice was used as redactor and capping agent. The as prepared gold NWs were examined by TEM, SAED, XRD, EDX and UV-vis spectra. The method developed is environmentally friendly and allows control of nanoparticles shapes by changing the concentrations of pomegranate juice.

Keywords: Green synthesis, Gold nanowires, Nanoparticles, Solar energy materials

1. Introduction

The electronic, optical, and catalytic properties of gold nanoparticles (NPs) are very different from those of their bulk counterpart. Most of these differences originate from the large surface area-to-volume ratio and the spatial confinement of the free electrons of gold NPs [1]. The shape of gold NPs is also an important parameter in governing their physical and chemical properties [2]. A variety of shapes have been obtained such as nanospheres [3], nanorods [4, 5], nanowires [6], nanoplates [7], nanocubes [8], and unusual angled shapes [9]. However, at recent years, one- and two-dimensional nanostructures for gold NPs are especially attractive [10].

At present, thin film solar cells which reduce both material and their processing cost significantly, have attracted the attention of optical researchers worldwide [11]. However, a major limitation with thin-film solar cells is the poor absorption of light as compared to wafer-based solar cells. A new method using plasmonic structures can improve the absorption of light due to excitation of localized surface plasmon [12]. Gold NPs with different morphology similar to other noble metals, support surface plasmon due to their free electron like behavior [13]. Among various

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