Clean Technologies and Environmental Policy
https://doi.org/10.1007/s10098-019-01726-9

ORIGINAL PAPER

Greener assembling of MoO_3 nanoparticles supported on gum arabic: cytotoxic effects and catalytic efficacy towards reduction of *p*-nitrophenol

Saranya Kothaplamoottil Sivan[1] · Akshay K.K. Padinjareveetil[2] · Vinod V. T. Padil[3] · Rajendra Pilankatta[4] · Bini George[1] · Chandra Senan[5] · Miroslav Černík[3] · Rajender S. Varma[6]

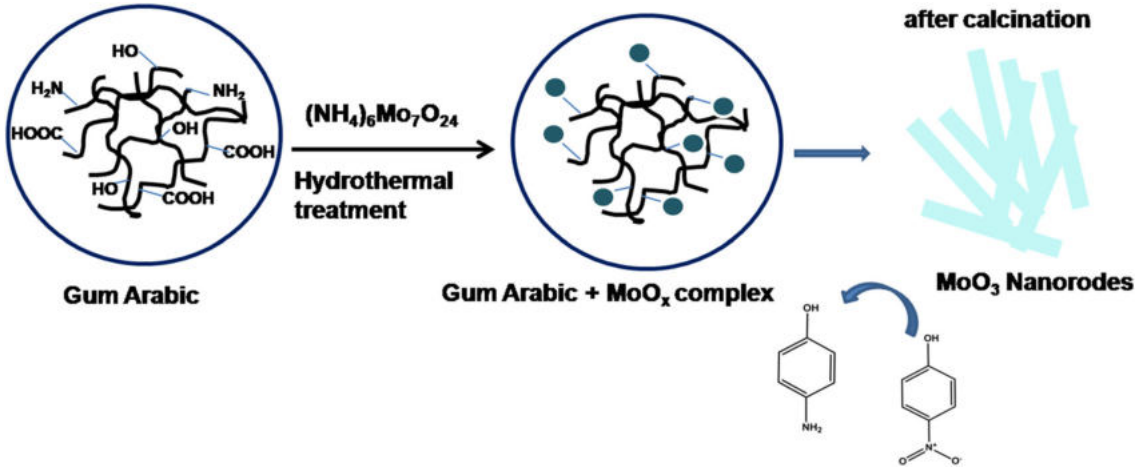
Received: 21 May 2019 / Accepted: 26 June 2019

Abstract

An economical and easy one-step method for the biosynthesis of highly stable molybdenum trioxide (MoO_3) nanoparticles was developed using gum arabic as a bio-template; ensuing nanoparticles (NP) were characterized by X-ray diffraction (XRD), Fourier-transform infrared (FTIR) spectroscopy, Raman spectroscopy, UV–visible spectroscopy, transmission electron microscopy (TEM) and energy-dispersive X-ray spectroscopy (EDX). The crystallinity and purity of MoO_3 nanoparticles in the orthorhombic phase were confirmed by XRD analysis, and their rod-shaped identity (average sizes ranging from 7.5 to 42 nm) were observed by TEM. Cytotoxic effects of the NP were monitored using Hep G2 (human liver cancer) and HEK 293 (human embryonic kidney) cell lines via 2,3-bis-(2-methoxy-4-nitro-5-sulfophenyl)-2H-tetrazolium-5-carboxanilide assays. The results of this study revealed that MoO_3 nanoparticles are nontoxic towards Hep G2 cell lines and displayed negligible toxicity, even at very high concentrations (1000 ppm), although had moderate toxicity towards HEK 293 cells. Furthermore, their catalytic activity was evaluated for the reduction of *p*-nitrophenol to *p*-aminophenol.

Graphical abstract

Synopsis: Green synthesis of MoO_3 nanorods using gum arabic demonstrated as an eco-friendly catalyst for the conversion of *p*-nitrophenol with negligible toxicity towards Hep *G*2 cell lines.



Keywords Gum arabic · Molybdenum trioxide nanoparticles · *p*-nitrophenol · XTT assay · Toxicity · Catalytic activity

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10098-019-01726-9) contains supplementary material, which is available to authorized users.

Extended author information available on the last page of the article

Published online: 05 July 2019