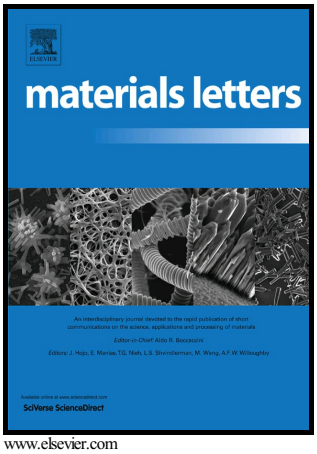

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Biogenic synthesis of antioxidant, shape selective gold nanomaterials mediated by high altitude lichens

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Abstract

Biogenic synthesis of gold nanoparticles have been accomplished using dried biomass of two high altitude lichen species, collected from the alpine region of Eastern Himalaya in Arunachal Pradesh state of North East India, without addition of any external reducing or stabilizing chemicals. The nanoparticles were characterised by UV-visible, FT-IR spectroscopy, powder X-ray diffraction (XRD), and transmission electron microscopy (TEM). The as-obtained gold nanoparticles showed surface plasmon resonance (SPR) band at ~535 nm. The XRD study furnished evidence for the formation of face-centered cubic structure of gold nanomaterials. The nanoparticles produced with *Acroscyphus sp.* consisted of multiply twinned quasi-spherical and prismatic shapes while those accessed with *Sticta sp.* are exclusively multiply twinned. The biomatrix loaded gold nanomaterial exhibited pronounced antioxidant activity.

Keywords: Biosynthesis; Nanoparticles; Electron microscopy; Multiply twinned; Antioxidant activity.

1. Introduction

Production of nanomaterials using biological precursors has created a fascinating intersection point between nanotechnology and biotechnology leading to the development of novel materials with potential for multitude of applications. Several researchers have reported simple synthesis strategies for the metal nanoparticles utilizing plant materials, neat or extracts [1-4]. Biogenic production of nanomaterials by various marine organisms has been recently reviewed comprehensively [1]. Gold nanoparticles (Au-NPs) are currently the subject of intense investigation due to their wide applications in optoelectronics, biosensors and catalysis [5, 6]. Several microorganisms like bacteria, fungi, lichen etc. have been employed for the biosynthesis of Au-NPs [2 and refs cited therein]. Dried biomass of a freshwater epilithic green alga, *Prasiola crispa*, collected from a high altitude river ecosystem has been recently reported by us to afford Au-NPs [7]. Another study from our group