

Biosynthesis of Silver Nanoparticles by Fungus *T. Reesei* (The Route for Large-Scale Production of AgNPs)

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The patent application "DA115/NPA - Biosynthesis of Silver Nanoparticles by Fungus *T. Reesei*" (US App. No. 12/511,800) by Prof. GA Mansoori (www.uic.edu/~mansoori/) was recently received "Notice of Allowance" by the U.S. Patent Office.

One of the requirements for advancement of nanotechnology is the development of reliable experimental protocols for the synthesis of desired nanomaterials. An attractive possibility of green nanotechnology is to use environmentally friendly micro-organisms in the synthesis of nanoparticles. Nanoparticles are considered as fundamental molecular building blocks for nanotechnology. AgNPs are widely incorporated into wound dressings, used as antiseptic and disinfectant in medical applications and in consumer goods, and have broad spectrum of antimicrobial and antiviral properties.

This patent is about the extracellular biosynthesis of silver nanoparticles (AgNPs) by using a fungus named *T. Reesei*, also known as *Hypocrea jecorina*. In the biosynthesis of AgNPs by *T. Reesei*, the fungus mycelium is exposed to the silver nitrate solution. That prompts *T. Reesei* to produce enzymes and metabolites for its own survival. In this process the Ag⁺ ions are reduced to the metallic AgNPs through the catalytic effect of the extracellular enzyme and metabolites of *T. Reesei*.

Absorption UV-Visible light spectroscopy is used to follow up with the reaction process. Fluorescence emission spectroscopy is used to produce detailed information on the progress of reduction of silver nitrate (formation of silver nanoparticles) on the nanosecond timescale. Fourier transform infrared spectroscopy is used for quantitative analyses of the reaction products. Such measurements indicate that extracellular biosynthesis of AgNPs by *T. Reesei* produces AgNPs with the diameters in the range of 5-50 nm.

***T. Reesei* is environmentally friendly and industrially abundant. Several industrially useful strains of *T. Reesei* have been developed and characterized. According to Prof. Mansoori this biosynthesis process is the only and best route for industrial (large-scale) production of silver and other metallic nanoparticles, which will bring down the cost of their production drastically.**