ABSTRACT

The present study deals with the bio-fabrication of AgA-AgNPs utilizing edible mushroom Agaricus *arvensis* as reductant for improved stability and catalytic efficiency towards L-dopa production. The parameters optimized for achieving maximum tyrosine hydroxylase activity were the mushroom biomass (2.5 %, w/v), media for extraction (peptone-saline), procurement period (24 min) and temperature (90°C). Moreover, the activity of TH was further enhanced by its immobilization on AgNPs. Higher propensity of AgA-AgNPs were obtained by optimizing multiple parameters. The change in color from light yellow to dark brown confirmed the formation of AgA-AgNPs. The UV-Vis spectrum showed surface plasmon resonance band at 260 nm. Fourier transform infrared (FTIR) spectroscopy exhibited phytochemicals in mushroom extract acting as bioreducers for AgA-AgNPs synthesis. XRD confirmed the crystalline nature of mycosynthesized AgNPs and showed peaks corresponding to 38.8o (111), 46.5o (200), 64.1o (220) and 77.5o (311). The phase and composition analysis of AgA-AgNPs were confirmed by metallurgical microscopy at 10X, 20X, 50X and 100X. Zetasizer determined the zeta potential and size distribution by intensity of AgA-AgNPs. AgA-AgNPs exhibited -9.16 mv zeta potential and Z-average 163.7 d.nm, respectively. SEM images of AgA-AgNPs confirmed particle size between 88.49±3.83 nm. The catalytic stability of free and immobilized TH checked by optimizing temperature (40°C) and pH (7.2). Immobilized TH extracted from *A. arvensis* showed reusability repeatedly at optimized temperature (20°C) for 3 cycles. The production of L-dopa was enhanced at 90 min of biotransformation reaction by free enzyme and AgA-AgNPs. A 2.54-fold increase in the production of L-dopa was examined with AgA-AgNPs. Furthermore, immobilized TH consumed more L-tyrosine i.e. 0.554±0.022 mg/ml as compared to free enzyme at 90 min of biotransformation. Hence, the immobilization of *A. arvensis* extracted TH on AgNPs increased its activity as well as its stability and catalytic efficiency