Soil-bacteria-mediated eco-friendly synthesis of ceramic nanostructure

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Abstract

Due to their magnetic and electrical properties, ceramic ferrite nanoparticles are a suitable option for use in various industries, including pharmaceutical, biomedical, food, and environmental. A total of 40 Gram-positive actinomycetes strains (named Ak1–40) were isolated from the soil and used to synthesize ceramic ferrite nanoparticles. To determine the identity of the isolated actinomycetes, its colonies were characterized morphologically using a scanning electron microscope (SEM). The PCR amplification (FD1 and RP2 primers) of 16 S rDNA gene was done to the genetically identification of the bacterial strain. Bacterial *Streptomyces fulvissimus* (isolate Ak10) was able to restore the production of ceramic ferrite nanoparticles. The characteristics of ceramic ferrite nanoparticles were examined through Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), and Vibrating Sample Magnetometry (VSM). The size of synthesized ceramic ferrite nanoparticles was less than 50 nm. This study is the first report on synthesizing ceramic ferrite nanoparticles by actinomycete soil bacteria. Using bacteria in synthesizing nanoparticles as nano-factories is a promising tool for the biological production of ceramic ferrite nanoparticles.