

บทคัดย่อภาษาอังกฤษ

In addition to the syntheses of magnetic nanoparticles (MNPs) via chemical and physical approaches, a biosynthesis of MNPs via living cells has gained many research interests. Some bacterial cells were reported to uptake iron ions from an environment and transformed them to MNPs inside or outside the cells. Nevertheless, there is still no study of these bacteria in Thailand. Thus, this research aimed to screen, characterize, and classify the bacteria producing MNPs which were isolated from iron-contaminated wastewater in Thailand, as well as to study the optimized conditions for their growth and production of MNPs. In this work, six isolated bacterial strains, designated as HER_I, HER_II, KPI_I, L3_5, SRL_I and TSB_II, were isolated, which were characterized as the magnetic producing bacteria due to their exhibition of weak magnetotactic behavior and presence of magnetosomes that contained iron oxide particles in a form of magnetite (Fe_3O_4) as determined by images of transmission electron microscope (TEM), the element analysis of TEM-energy dispersive X-ray spectroscopy (EDX), and the analysis of TEM-selected area electron diffraction (SAED). In addition, the biochemical analyses identified these bacteria in the groups of microaerophilic and anaerobic bacteria. The nucleotide sequences of 16S rRNA analysis could identify them at the genus level. Among 6 strains of the isolated bacteria, *Acinetobacter* sp. strain HER_I was chosen for further studies on its optimized growth condition and production of iron oxide particles. Results showed that its optimal growth condition was to use the modified MTB medium with 10 mM acetic acid, pH 6.9 at 25 °C, however, this condition did not support the formation of Fe_3O_4 nanoparticles. Formation of Fe_3O_4 nanoparticles was found only when they were cultured in the modified MTB medium without an acetic acid supplement. The amount of synthesized Fe_3O_4 nanoparticles was increased according to its growth from an early log phase to a late log phase as determined by the fluorescence mode of synchrotron X-ray Absorption Near Edge Structure analysis. *Acinetobacter* sp. strain HER_I could grow in the modified MTB medium supplement with the iron ion solution as high as 160 mg/l. Also, its ability to uptake iron ions was significantly higher than those of *Escherichia coli* and *Staphylococcus aureus*, while its capability to adsorb iron ions was similar to *E. coli* but significantly greater than *S. aureus*. The results of this work suggested that *Acinetobacter* sp. strain HER_I, the first magnetic producing bacteria isolated in Thailand, could be a potential bacterial strain for a production of magnetic nanoparticles and a bioremediation of high iron-contaminated water.