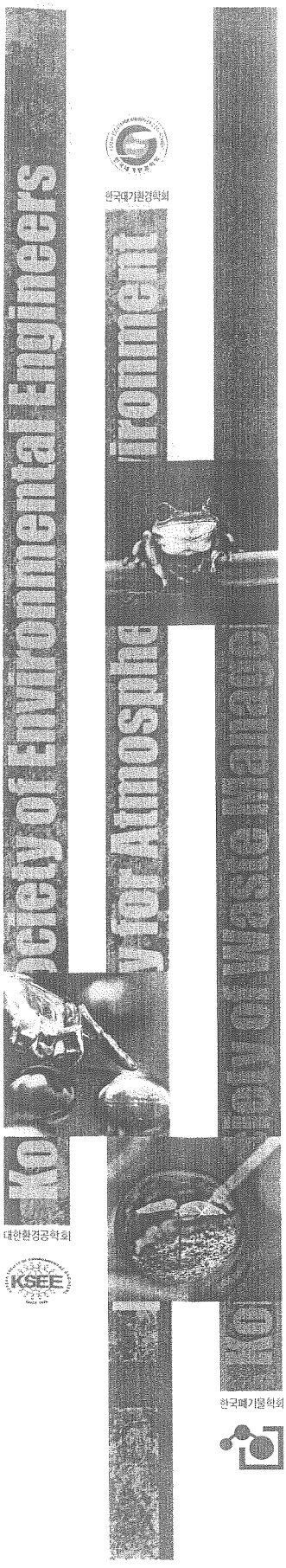

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Protein Modifications in Isolated Heavy Metal Resistant Microorganisms from the Contaminated Environment

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1. Introduction

The discharge of heavy metals especially chromium and nickel into the environment due to agricultural, industrial, and military operations and their effects on the ecosystem and human health are of growing concern. These two metals are of importance because of their larger usages in developing countries and their nondegradability nature. Conventional physicochemical methods for heavy metal removal from waste streams are not cost effective and hence biological approach has been considered as an alternative remediation for heavy metal contamination. Recently microbial systems like fungus and bacteria have been successfully used as adsorbing agents for removal of heavy metals [1]. The use of microorganisms to sequester, precipitate, or alter the oxidation state of various heavy metals has been extensively studied [2]. Recent research in the area of heavy metal removal from wastewaters and sediments has focused on the development of materials with increased affinity, capacity, and selectivity for target metals. Expression of metal binding proteins (metallothioneins or metallopeptides) to increase the affinity and biosorptive capabilities of microbial cells for heavy metals is a promising technology for the development of microbial-based biosorbents. In addition to the understanding of the molecular genetics and environmental roles of these resistances, studies during the last few years have provided surprises and new biochemical mechanisms such as chromosomal and plasmid determinants of toxic metal resistances, transport ATPases and metallothionein cation-binding proteins. The largest groups of metal resistance system function by energy-dependent efflux of toxic ions. Some of the efflux systems are ATPases and others are chemiosmotic cation/proton antiporters. In the present investigation the protein modification and expression due to the exposure of chromium and nickel in isolated Micrococcus sp. and Aspergillus sp. were analyzed and their ability to remediate these heavy metals were evaluated by analyzing the effect of temperature, pH and tolerance to the heavy metals.

2. Materials and methods

Chromium and nickel resistant bacterial and fungal species were isolated the soil samples of the contaminated site using standard protocols. The fungal and bacterial isolates were inoculated in 100 mg L^{-1} of chromium or 50 mg L^{-1} of nickel. The pH (3- 11), temperatures (29-36 ℃), incubation time(2 h intervals) and initial heavy metal concentration were varied and shaken in a rotary shaker (120 rpm).