Application of Leaf, Stem and Root of Mangrove
(*Avicennia marina*) Collected from Nayband Bay
in Bushehr Province for Biosynthesis of Silver
Nanoparticles

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Abstract

In present research, the biosynthesis possibility of silver nanoparticles (AgNPs) was investigated using
the aqueous extract of leaf, stem and root of native mangrove plant *Avicennia marina*, collected from
Nayband bay in Bushehr province. Silver nanoparticles were synthesized through reduction of silver ions
by secondary metabolites from the extract of *Avicennia marina*. Among the different plant parts, the leaf
extract showed the maximum spectral absorption and synthesis yield of AgNPs. Absorption spectra in 420
nm confirmed the synthesis of AgNPs. The crystalline nature of AgNPs was confirmed based on the XRD
pattern. TEM images showed that the size of nanoparticles was in the range of 1 to 75 nm. The distribution
size histogram revealed that most of the particles were in the range of 10-15 nm and the mean size of
nanoparticles was 17.3 nm. FE-SEM analysis showed the size ranges of the nanoparticles between 15 to 43
nm. EDS spectrum confirmed the presence of elements like silver, carbon, chlorine, nitrogen and oxygen
in the synthesized nanoparticles and silver had the maximum percentage of 51.6 %. FTIR spectrum
indicated the presence of different functional groups like amines, alcohol, aromatic loops, alkanes,
phenolic groups and alkyl halides in the synthesis process. The results of this research revealed that silver
nanoparticles could be synthetized by eco-friendly biological procedures without mediating harmful
chemical using reductant components of extracts of plants such as mangroves.

Keywords: Nanotechnology, Silver ion, Biosynthesis, *Avicennia marina*. 