Green synthesis of silver nanoparticles using *Melaleuca cajuputi* leaves extract and their catalytic degradation of cationic and anionic dyes

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Abstract: Nowadays, release of hazardous dyes from textile industries in water bodies like lakes, rivers and groundwater has become a serious problem, which contributes to increase their pollution levels significantly. These pollutants are difficult to remove by traditional water treatment procedures. Therefore, there is a need to develop more suitable methods of effluent treatment. Here, silver nanoparticles (AgNPs) were produced using *Melaleuca cajuputi* leaves extract. The materials were characterized using UV-Vis spectroscopy, SEM/EDX, LPSA, and FTIR techniques. UV-vis spectra showed maximum absorption peak at 406 nm, which represents the characteristic surface plasmon resonance of the nanosilver. The structure of the particles was spherical as observed in SEM. FTIR analysis was carried out to probe the possible functional groups involved in the synthesis of AgNPs. The mean particle size calculated using LPSA was 49±1.0 nm. The obtained nanoparticles were then utilized as nanocatalyst for decolorization of aqueous solutions containing methylene blue (MB) and methyl orange (MO) dyes. The report emphasizes that the AgNPs are observed to be an excellent catalyst on reduction of both hazardous dyes, which is confirmed by a decrease in maximum absorbance values.

Keywords: Silver nanoparticle; Leaves extract; Catalytic degradation; Methylene blue; Methyl orange