Meetings International

23rd International Conference on

NANOTECHNOLOGY

June 27-28,2024 | London, UK

Green synthesis of zinc oxide nanoparticles using Pistacia lentiscus L. extract leaf and its antioxydant and antibacterial activities

Haddi R

TAHRI Mohamed University Bechar, Algeria

Statement of the Problem: Can composite particles be improved to be more effective than plant extracts while also being environmentally friendly and less expensive?

The purpose of this study is to evaluate the antioxydant and antibacterial activities of green synthetised zinc oxide (ZnO) nanoparticles by the reducing and capping agent of Pistacia lentiscus leaf extract.

Methodology: The optical and structural proprieties of (ZnO) nanoparticles are determined by UV–Vis, Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) and their morphology investigated with a scanning electron microscopy SEM with EDS. The evaluation of antioxidant activity is assessed by the DPPH test, using TLC bioautography and spectrophotometric assay, The antibacterial activity is tested on two Gram-positive bacterial strains: Staphylococcus aureus, Bacillus cereus, and two Gram-negative strains : Escherichia coli, Pseudomonas aeruginosa with determination of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC).

Findings: UV–Vis spectrum shows an absorption peak maximum of 310 nm. FTIR spectra exhibit a peak at 680 cm-1 attributed to zinc oxide nanoparticles vibration confirming the formation of nanoparticles. The X-ray shows the good crystalline quality of the ZnO product with very well defined peaks on the planes (002), (100) and (101) indexed as an hexagonal structure (JCPDS-file : 36-1451). The grain size of ZnO nanoparticles is 33.90 nm. These laters have a similar shape to dried cotton and the EDS confirms the presence of Zinc and Oxygen.

The antioxidant activity shows a very high anti-radical potential, for methanolic extract, followed by aqueous, etheric and finally zinc oxide nanopartices. The antibacterial activity, zinc oxide nanoparticles exhibit a significantly notable antibacterial effect in comparison to crude extracts presenting a zone of inhibition of 24±1mm and 20±2 mm respectively against Escherichia coli and Pseudomonas aeruginosa with a bactericidal effect with a CMB/CMI equal to 2.

Conclusion: Our results are very promising. The E. coli and P. aeruginosa strains, previously resistant to the tested extracts, have shown a considerable increase in sensitivity towards zinc oxide nanoparticles.

Biography

Currently a teaching researcher at Mohamed Tahri University, Bechar, Algeria, where the privilege of teaching in the field of biology since 2005. Throughout my academic career, developed expertise in the fields of applied biochemistry, microbiology, and molecular biology. Ph.D. in Sciences from Ahmed Benbella University in Oran, Algeria. Doctoral research focused on the valorization of Algerian medicinal plants and the evaluation of their biological activities, which has deepened understanding of phytochemistry. Currently, researching the synergy between zinc oxide nanoparticles and antibiotics to test their antibacterial and antifungal activity. Deeply committed to education and research at the university, continually striving to inspire students and contribute to the advancement of knowledge in field of expertise.