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Palladium Nanoparticles synthesis, characterization using glucosamine as the reductant and stabilizing agent to explore their antibacterial & catalytic applications

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Abstract

Low cost and an easy technique for the synthesis of palladium nanoparticles (PdNPs) was developed. Glucosamine was used to stabilize palladium precursor (PdCl₂) into palladium nanoparticles. Several analytical techniques were used for the determination of morphology, crystalline structure; size, capping, and composition of synthesized palladium nanoparticles. The UV-visible spectroscopy SPR peak (Surface Plasmon Resonance) at 284 nm revealed synthesis of PdNPs. Energy dispersive X-ray (EDX) and X-ray diffraction (XRD) studies proved the elemental composition and crystalline structure of the synthesized palladium nanoparticles respectively. The average particle sizes (5.5 nm) were obtained by using the 1 M glucosamine solution, with a fixed amount of PdCl₂ (4 mM). Moreover, the as synthesized PdNPs was evaluated against Gram negative bacterial *E. coli* which shows tremendous antibacterial activity as compare to tobramycin standard antibiotics. It's mechanistically found that PdNPs damage cell membrane and caused imbalance of metabolism system of the cell as a result production of reactive oxygen species (ROS). Thus, these finding revealed that cells become leaky and all

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