

Biological Synthesis of Metal Nanoparticles Using Plant Extracts

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We report on the use of plant extracts in the extracellular synthesis of metallic silver, gold and platinum nanoparticles. On treatment of aqueous solutions of AgNO_3 , KAuCl_4 and $\text{H}_2\text{PtCl}_6 \cdot 6\text{H}_2\text{O}$ with several leaf extracts (Pine, Persimmon, Ginkgo, etc.), stable Ag, Au and Pt nanoparticles were rapidly formed. UV-visible spectroscopy was used to monitor the quantitative formation of Ag, Au and Pt nanoparticles. All the synthesized metal nanoparticles were characterized with ICP, EDS, SEM, XRD and particle analyzer. Particle analyzer analysis of Ag, Au and Pt particles indicated that they ranged in size from 15 to 100 nm. Particles size could be controlled by reaction temperature, plant extracts concentration and aqueous metal salt concentration. In some cases of silver and gold nanoparticles, the reaction completed more than 90% within 1 hour. On the other hand, more than 90% of platinum nanoparticles were formed over 5 hour. This environment-friendly method of biological nanoparticle synthesis provides rates of synthesis comparable to those of chemical methods and can potentially be used in various human body-contacting areas such as cosmetics, foods, medical and pharmaceutical applications.